This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

CALIFORNIA
FISH AND GAME

1911
15/-
7995

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
GEORGE OTIS SMITH, DIRECTOR

WATER-SUPPLY PAPER 291

SURFACE WATER SUPPLY OF THE UNITED STATES

1910

PART XI. PACIFIC COAST IN CALIFORNIA

PREPARED UNDER THE DIRECTION OF M. O. LEIGHTON

BY

W. B. CLAPP, F. F. HENSHAW, AND
H. D. McGLASHAN

WASHINGTON
GOVERNMENT PRINTING OFFICE
1912

CONTENTS.

	Page.
ıtroduction	7
Authority for investigations	7
Scope of investigations	8
Publications	9
Definition of terms	12
Convenient equivalents	12
Explanation of data	13
Accuracy and reliability of field data and comparative results	15
Use of the data	17
Cooperative data	17
Cooperation and acknowledgments	18
Division of work	19
aging stations maintained in Pacific drainage basins in California	19
ɔuth Pacific Ocean drainage basins	22
General features	22
Tia Juana River basin	23
Cottonwood Creek and Dulzura canal near Jamul, Cal	23
Sweetwater River basin	28
Sweetwater River near Descanso, Cal	28
San Diego River basin	31
San Diego River and flume near Lakeside, Cal	31
San Dieguito River basin	36
Santa Ysabel Creek near Escondido, Cal	36
San Luis Rey River basin	39
San Luis Rey River near Pala, Cal	39
Santa Ana River basin	41
Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal	41
San Gabriel River basin	47
San Gabriel River and power canal near Azusa, Cal	47
Los Angeles River basin	51
Arroyo Seco near Pasadena, Cal	51
Santa Ynez River basin	52
General features	52
Santa Ynez River near Santa Barbara, Cal	53
Santa Ynez River near Lompoc, Cal	54
Salinas River basin	56
Arroyo Seco near Soledad, Cal	56
an Francisco Bay drainage basins	59
San Joaquin River system	59
General features	59
San Joaquin River near Friant, Cal	60
San Joaquin River at Herndon, Cal	62
Tulare Lake basin	62
General features	62
Tulare Lake in Kings County, Cal	63

San Francisco Bay drainage basins—Continued.
San Joaquin River system—Continued.
Tulare Lake basin—Continued. Page.
Kern River basin ... 64
General features ... 64
Kern River at Isabella, Cal ... 65
Kern River near Bakersfield, Cal ... 66
South Fork of Kern River at Isabella, Cal ... 67
White River basin ... 68
Deer Creek at Hot Springs, Cal ... 68
Tule River basin ... 69
General features ... 69
Tule River near Portersville, Cal ... 69
South Fork of Tule River near Success, Cal ... 71
Kaweah River basin ... 72
General features ... 72
Kaweah River near Three Rivers, Cal ... 73
North Fork of Kaweah River at Kaweah, Cal ... 75
Kings River basin ... 76
General features ... 76
Kings River near Sanger, Cal ... 76
Dinkey Creek near Ockenden, Cal ... 79
Rush Creek near Ockenden, Cal ... 80
Fresno River basin ... 81
General features ... 81
Fresno River near Fresno Flats, Cal ... 81
North Fork of Fresno River near Sugar Pine, Cal ... 82
Merced River basin ... 82
General features ... 82
Merced River near Merced Falls, Cal ... 83
South Fork of Merced River at Wawona, Cal ... 85
Big Creek near Wawona, Cal ... 86
Tuolumne River basin ... 86
General features ... 86
Tuolumne River near Lagrange, Cal ... 87
Modesto canal near Lagrange, Cal ... 90
Turlock canal near Lagrange, Cal ... 92
Lagrange Water & Power Co.'s canal near Lagrange, Cal ... 94
Jawbone Creek near Tuolumne, Cal ... 95
Corral Creek near Groveland, Cal ... 96
South Fork of Tuolumne River near Groveland, Cal ... 97
Clavey Creek near Groveland, Cal ... 98
Indian Creek near Tuolumne, Cal ... 99
North Fork of Tuolumne River near Tuolumne, Cal ... 99
Hunter Creek near Tuolumne, Cal ... 100
Stanislaus River basin ... 101
General features ... 101
Stanislaus River at Knights Ferry, Cal ... 101
Stanislaus Water Co.'s canal at Knights Ferry, Cal ... 104
Rose Creek near Jupiter, Cal ... 107
Knight Creek near Jupiter, Cal ... 108
South Fork of Stanislaus River near Columbia, Cal ... 109
Calaveras River basin ... 110
Calaveras River at Jenny Lind, Cal ... 110

an Francisco Bay drainage basins—Continued.
San Joaquin River system—Continued. Page.
Mokelumne River basin ... 113
General features ... 113
Mokelumne River near Clements, Cal ... 113
Cosumnes River at Michigan Bar, Cal ... 116
Sacramento River system ... 118
General features ... 118
Sacramento River at Castella, Cal ... 119
Sacramento River at Antler, Cal ... 120
Sacramento River near Red Bluff, Cal ... 121
Pit River basin ... 123
General features ... 123
Pit River at Henderson, Cal ... 124
Pit River near Ydalpom, Cal ... 125
Goose Lake basin ... 126
Cottonwood Creek near Lakeview, Oreg ... 126
Drews Creek near Lakeview, Oreg ... 129
Hat Creek at Hat Creek, Cal ... 134
Kosk Creek near Henderson, Cal ... 135
McCloud River at Baird, Cal ... 135
Cottonwood Creek basin ... 136
North Fork of Cottonwood Creek at Ono, Cal ... 136
Mill Creek basin ... 138
Mill Creek near Los Molinos, Cal ... 138
Stony Creek basin ... 139
General features ... 139
Stony Creek near Fruto, Cal ... 140
Little Stony Creek near Lodoga, Cal ... 142
Feather River basin ... 144
General features ... 144
North Fork of Feather River below Prattville, Cal ... 145
North Fork of Feather River near Big Bend, Cal ... 147
Feather River at Oroville, Cal ... 148
Butt Creek at Butte Valley, Cal ... 151
Middle Fork of Feather River at Cromberg, Cal ... 152
Middle Fork of Yuba River near North San Juan, Cal ... 153
Yuba River near Smartsville, Cal ... 154
North Fork of Yuba River at Goodyear Bar, Cal ... 156
Oregon Creek near North San Juan, Cal ... 158
North Fork of North Fork of Yuba River at Downieville, Cal ... 158
Rock Creek at Goodyear Bar, Cal ... 159
Goodyear Creek at Goodyear Bar, Cal ... 160
Bear River at Van Trent, Cal ... 161
American River basin ... 164
American River near Fairoaks, Cal ... 164
Cache Creek basin ... 166
General features ... 166
Cache Creek at Lower Lake, Cal ... 167
Cache Creek near Yolo, Cal ... 169
Putah Creek basin ... 171
Putah Creek at Winters, Cal ... 171

Page.
North Pacific Ocean drainage basins 174
Russian River basin 174
Russian River at Geyserville, Cal 174
Eel River basin 175
General features 175
South Eel River at Hearst, Cal 175
Eel River at Scotia, Cal 176
Mad River basin 177
Mad River near Arcata, Cal 177
Klamath River basin 178
General features 178
Upper Klamath Lake near Klamath Falls, Oreg 179
Link River at Klamath Falls, Oreg 180
Klamath River at Keno, Oreg 183
Klamath River near Requa, Cal 185
Williamson River near Klamath Agency, Oreg 186
Lost River at Olene, Oreg 188
Tule Lake near Merrill, Oreg 191
Miller Creek near Lorella, Oreg 192
East Fork of Scott River near Callahan, Cal 195
Trinity River near Trinity Center, Cal 196
Coffee Creek at Coffee, Cal 197
East Fork of Trinity River near Trinity Center, Cal 197
Swift Creek near Trinity Center, Cal 198
Miscellaneous measurements 199
Index 205

ILLUSTRATIONS.

Page.
PLATE I. Typical gaging stations: *A*, For bridge measurement; *B*, For wading measurement 14
II. Price penta-recording current meters 15
III. *A*, Tuolumne River near mouth of Conness Creek; *B*, Falls of Rancheria Creek, Hetch Hetchy Valley 86
IV. *A*, Bowman dam, South Fork of Yuba River; *B*, Great Western Power Co.'s plant on North Fork of Feather River at Big Bend 144
FIGURE 1. Gage-height record of Kings River near Sanger, Cal., May 22–29, 1910 77

SURFACE WATER SUPPLY OF PACIFIC COAST IN CALIFORNIA, 1910.

By W. B. CLAPP, F. F. HENSHAW, and H. D. MCGLASHAN.

INTRODUCTION.

AUTHORITY FOR INVESTIGATIONS.

This volume contains results of measurements of the flow of certain streams in the United States. The work was performed by the water-resources branch of the United States Geological Survey, either independently or in cooperation with private or State organizations. The organic law of the Geological Survey (Stat. L., vol. 20, p. 394) contains the following paragraph:

> Provided that this officer [the Director] shall have the direction of the geological survey and the classification of public lands and examination of the geological structures, mineral resources, and products of the national domain.

As water is the most abundant and most valuable of the minerals, the investigation of water resources is authorized under the provision for examining mineral resources. The work has been supported since the fiscal year ending June 30, 1895, by appropriations in successive sundry civil bills passed by Congress under the following item:

> For gaging the streams and determining the water supply of the United States, and for the investigation of underground currents and artesian wells, and for the preparation of reports upon the best methods of utilizing the water resources.

The appropriations that have been made for this purpose are as follows:

Annual appropriations for the fiscal year ending June 30—

1895	$12,500
1896	20,000
1897 to 1900, inclusive	50,000
1901 to 1902, inclusive	100,000
1903 to 1906, inclusive	200,000
1907	150,000
1908 to 1910, inclusive	100,000
1911	150,000

SCOPE OF INVESTIGATIONS.

These investigations are not complete nor do they include all the streams that might purposefully be studied. The scope of the work is limited by the appropriations available. The field covered is the widest and the character of the work is believed to be the best possible under the controlling conditions. The work would undoubtedly have greater scientific importance and ultimately be of more practical value if the money now expended for wide areas were concentrated on a few small drainage basins; but such a course is impossible because general appropriations made by Congress are applicable to all parts of the country. Each part demands its proportionate share of the benefits.

It is essential that records of stream flow shall be kept during a period of years long enough to determine within reasonable limits the entire range of flow from the absolute maximum to the absolute minimum. The length of such a period manifestly differs for different streams. Experience has shown that the records for some streams should cover 5 to 10 years and those for other streams 20 years or even more, the limit being determined by the relative importance of the stream and the relation of the results to other long-time records on adjacent streams.

In the performance of this work an effort is made to reach the highest degree of precision possible with a rational expenditure of time and a judicious expenditure of a small amount of money. In all engineering work there is a point beyond which refinement is needless and wasteful, and this statement applies with especial force to stream-flow measurements. It is confidently believed that the stream-flow data presented in the publications of the Survey are in general sufficiently accurate for all practical purposes. Many of the records are, however, of insufficient length, owing to the unforeseen reduction of appropriations and consequent abandonment of stations. All persons are cautioned to exercise the greatest care in using such incomplete records.

Records have been obtained at nearly 2,000 different points in the United States. The surface water supply of small areas in Seward Peninsula and the Yukon-Tanana region, Alaska, and in Hawaii has also been investigated. During 1910 regular gaging stations were maintained by the survey and cooperating organizations at about 1,100 points in the United States, and many discharge measurements were made at other points. Data were also obtained in regard to precipitation, evaporation, storage reservoirs, river profiles, and water power in many sections of the country and will be made available in the regular surface water-supply papers and in special papers from time to time.

PUBLICATIONS.

The data on stream flow collected by the United States Geological Survey have appeared in the annual reports, bulletins, and water-supply papers. Owing to natural processes of evolution and to changes in governmental requirements, the character of the work and the territory covered by these different publications have varied greatly. For the purpose of uniformity in the presentation of reports a general plan has been agreed upon by the United States Reclamation Service, the United States Forest Service, the United States Weather Bureau, and the United States Geological Survey, according to which the area of the United States has been divided into 12 parts, whose boundaries coincide with certain natural drainage lines. The areas so described are indicated by the following list of papers on surface water supply for 1910. The dividing line between the north Atlantic and south Atlantic drainage areas lies between York and James rivers.

Papers on surface water supply of the United States, 1910.

Part.	No.	Title.
I	281	North Atlantic coast.
II	282	South Atlantic coast and eastern Gulf of Mexico.
III	283	Ohio River basin.
IV	284	St. Lawrence River basin.
V	285	Upper Mississippi River and Hudson Bay basins.
VI	286	Missouri River basin.
VII	287	Lower Mississippi River basin.
VIII	288	Western Gulf of Mexico.
IX	289	Colorado River basin.
X	290	Great Basin.
XI	291	Pacific coast in California.
XII	292	North Pacific coast.

The following table gives the character of data regarding stream flow at regular stations to be found in the various publications of the United States Geological Survey, exclusive of special papers:

Stream-flow data in reports of the United States Geological Survey.

[A.= Annual Report; B.= Bulletin; W S.= Water-Supply Paper.]

Report.	Character of data.	Year.
10th A., pt. 2	Descriptive information only	
11th A., pt. 2	Monthly discharge	1884 to Sept., 1890.
12th A., pt. 2	....do	1884 to June 30, 1891.
13th A., pt. 3	Mean discharge in second-feet	1884 to Dec. 31, 1892.
14th A., pt. 2	Monthly discharge (long-time records, 1871 to 1893)	1888 to Dec. 31, 1893.
B. 131	Descriptions, measurements, gage heights, and ratings	1893 and 1894.
16th A., pt. 2	Descriptive information only	
B. 140	Descriptions, measurements, gage heights, ratings, and monthly discharge (also many data covering earlier years).	1895.
W S. 11	Gage heights (also gage heights for earlier years)	1896.
18th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also similar data for earlier years).	1895 and 1896

Stream-flow data in reports of the United States Geological Survey—Continued.

Report.	Character of data.	Year.
W S. 15	Descriptions, measurements, and gage heights, eastern United States, eastern Mississippi River, and Missouri River above junction with Kansas.	1897.
W S. 16	Descriptions, measurements, and gage heights, western Mississippi River below junction of Missouri and Platte, and western United States.	1897.
19th A., pt. 4	Descriptions, measurements, ratings, and monthly discharge (also some long-time records).	1897.
W S. 27	Measurements, ratings, and gage heights, eastern United States, eastern Mississippi River, and Missouri River.	1898.
W S. 28	Measurements, ratings, and gage heights, Arkansas River and western United States.	1898.
20th A., pt. 4	Monthly discharge (also for many earlier years)	1898.
W S. 35 to 39	Descriptions, measurements, gage heights, and ratings	1899.
21st A., pt. 4	Monthly discharge	1899.
W S. 47 to 52	Descriptions, measurements, gage heights, and ratings	1900.
22d A., pt 4	Monthly discharge	1900.
W S. 65, 66	Descriptions, measurements, gage heights, and ratings	1901.
W S. 75	Monthly discharge	1901.
W S. 82 to 85	Complete data	1902.
W S. 97 to 100	....do	1903.
W S. 124 to 135	....do	1904.
W S. 165 to 178	....do	1905.
W S. 201 to 214	Complete data, except descriptions	1906.
W S. 241 to 252	Complete data	1907–8.
W S. 261 to 272	....do	1909.
W S. 281 to 292	....do	1910.

NOTE.—No data regarding stream flow are given in the 15th and 17th annual reports.

The records at most of the stations discussed in these reports extend over a series of years. An index of the reports containing records prior to 1904 has been published in Water-Supply Paper 119.

The first table which follows gives, by years and drainage basins, the numbers of the papers on surface water supply published from 1899 to 1909. Wherever the data for a drainage basin appears in two papers the number of one is placed in parentheses and the portion of the basin covered by that paper is indicated in the second table. For example, in 1904 the data for Missouri River were published in Water-Supply Papers 130 and 131, and the portion of the records contained in Water-Supply Paper 131, as indicated by the second table, is that relating to Platte and Kansas rivers.

Numbers of water-supply papers containing results of stream measurements, 1899–1910.

	1899[a]	1900[b]	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Atlantic coast and eastern Gulf of Mexico:											
New England rivers	35	47	65,75	82	97	124	165	201	241	261	281
Hudson River to Delaware River, inclusive	35	47, (48)	65,75	82	97	125	166	202	241	261	281
Susquehanna River to York River, inclusive	35	48	65,75	82	97	126	167	203	241	261	281
James River to Yadkin River, inclusive	(35), 36	48	65,75	(82), 83	(97), 98	126	167	203	242	262	282
Santee River to Pearl River, inclusive	36	48	65,75	83	98	127	168	204	242	262	282
St. Lawrence River	36	49	65,75	(82), 83	97	129	170	206	244	264	284
Hudson Bay	.....	.....	66,75	85	100	130	171	207	245	265	285

[a] Rating tables and index to Water-Supply Papers 35–39 contained in Water-Supply Paper 39.
[b] Rating tables and index to Water-Supply Papers 47–52 and data on precipitation, wells, and irrigation in California and Utah contained in Water-Supply Paper 52.

Numbers of water-supply papers containing results of stream measurements, 1899–1910—Continued.

	1899	1900	1901	1902	1903	1904	1905	1906	1907–8	1909	1910
Mississippi River:											
Ohio River	36	48, (49)	65, 75	83	98	128	169	205	243	263	283
Upper Mississippi River	36	49	65, 75	83	98, (99)	128, (133)	171	207	245	265	285
Missouri River	(36), 37	49, (50)	66, 75	84	99	130, (131)	172	208	246	266	286
Lower Mississippi River	37	50	(65), 66, 75	(83), 84	(98), 99	(128), 131	(169), 173	(205), 209	247	267	287
Western Gulf of Mexico	37	50	66, 75	84	99	132	174	210	248	268	288
Pacific coast and Great Basin:											
Colorado River	(37), 38	50	66, 75	85	100	133, (134)	175, (177)	211, (213)	249, (251)	269, (271)	289
Great Basin	38, (39)	51	66, 75	85	100	133, (134)	176, (177)	212, (213)	250, (251)	270, (271)	290
South Pacific coast to Klamath River, inclusive	(38), 39	51	66, 75	85	100	134	177	213	251	271	291
North Pacific coast	38	51	66, 75	85	100	135	(177), 178	214	252	272	292

Numbers of water-supply papers containing data covering portions of drainage basins.

No.	River basin.	Tributaries included.
35	James	
36	Missouri	Gallatin.
37	Colorado	Green, Gunnison, Grand above junction with Gunnison.
38	Sacramento	Except Kings and Kern.
39	Great Basin	Mohave.
48	Delaware	Wissahickon and Schuylkill.
49	Ohio	Scioto.
50	Missouri	Loup and Platte near Columbus, Nebr. All tributaries below junction with Platte.
65	Lower Mississippi	Yazoo.
82	James	
	St. Lawrence	Lake Ontario, tributaries to St. Lawrence River proper.
83	Lower Mississippi	Yazoo.
97	James	
98	Lower Mississippi	Do.
99	Upper Mississippi	Tributaries from the west.
128	Lower Mississippi	Yazoo.
130	Upper Mississippi	Tributaries from the west.
131	Missouri	Platte, Kansas.
134	Colorado	Data near Yuma, Ariz., repeated.
	Great Basin	Susan, Owens, Mohave.
169	Lower Mississippi	Yazoo.
177	Colorado	Below junction with Gila.
	Great Basin	Susan repeated, Owens, Mohave.
	North Pacific coast	Rogue, Umpqua, Siletz.
205	Lower Mississippi	Yazoo, Homochitto.
213	Colorado	Data at Hardyville repeated; at Yuma, Salton Sea.
	Great Basin	Owens, Mohave.
251	Colorado	Yuma and Salton Sea stations repeated.
271	Great Basin	Owens River basin.

The order of treatment of stations in any basin in these papers is downstream. The main stem of any river is determined by measuring or estimating the drainage area; that is, the headwater stream having the largest drainage area is considered the continuation of the main stream and local changes in name and lake surface are disregarded. Records for all stations from the source to the mouth of the main stem of the river are presented first, and records for the tributaries in regular order from source to mouth follow, all records for each tributary basin being given before those of the next basin below.

The exceptions to this rule occur in the records for Mississippi River, which are given in four parts, as indicated above, and in the records for large lakes, where it is simpler to take up the streams in regular order around the rim of the lake than to cross back and forth over the lake surface.

DEFINITION OF TERMS.

The volume of water flowing in a stream—the "run-off" or "discharge"—is expressed in several terms, each of which has become associated with a certain class of work. These terms may be divided into two groups—(1) those which represent a rate of flow, as second-feet, gallons per minute, miner's inches, and run-off in second-feet per square mile, and (2) those which represent the actual quantity of water, as run-off in depth in inches and acre-feet. The units used in this series of reports are second-foot, second-feet per square mile, and run-off in inches and acre-foot. They may be defined as follows:

"Second-foot" is an abbreviation for cubic foot per second and is the rate of discharge of water flowing in a stream 1 foot wide, 1 foot deep, at a rate of 1 foot per second. It is generally used as a fundamental unit from which others are computed by the use of the factors given in the following table of equivalents:

"Second-feet per square mile" is the average number of cubic feet of water flowing per second from each square mile of area drained, on the assumption that the run-off is distributed uniformly both as regards time and area.

"Run-off in inches" is the depth to which the drainage area would be covered if all the water flowing from it in a given period were conserved and uniformly distributed on the surface. It is used for comparing run-off with rainfall, which is usually expressed in depth in inches.

"Acre-foot" is equivalent to 43,560 cubic feet, and is the quantity required to cover an acre to the depth of 1 foot. It is commonly used in connection with storage for irrigation work.

CONVENIENT EQUIVALENTS.

The following is a list of convenient equivalents for use in hydraulic computations:

1 second-foot equals 40 California miner's inches (law of Mar. 23, 1901).
1 second-foot equals 38.4 Colorado miner's inches.
1 second-foot equals 40 Arizona miner's inches.
1 second-foot equals 7.48 United States gallons per second; equals 448.8 gallons per minute; equals 646,317 gallons for one day.
1 second-foot equals 6.23 British imperial gallons per second.
1 second-foot for one year covers 1 square mile 1.131 feet or 13.275 inches deep.
1 second-foot for one year equals 31,536,000 cubic feet.
1 second-foot equals about 1 acre-inch per hour.
1 second-foot for one day covers 1 square mile 0.03719 inch deep.
1 second-foot for one 28-day month covers 1 square mile 1.041 inches deep.

1 second-foot for one 29-day month covers 1 square mile 1.079 inches deep.
1 second-foot for one 30-day month covers 1 square mile 1.116 inches deep.
1 second-foot for one 31-day month covers 1 square mile 1.153 inches deep.
1 second-foot for one day equals 1.983 acre-feet.
1 second-foot for one 28-day month equals 55.54 acre-feet.
1 second-foot for one 29-day month equals 57.52 acre-feet.
1 second-foot for one 30-day month equals 59.50 acre-feet.
1 second-foot for one 31-day month equals 61.49 acre-feet.
100 California miner's inches equals 18.7 United States gallons per second.
100 California miner's inches equals 96 Colorado miner's inches.
100 California miner's inches for one day equals 4.96 acre-feet.
100 Colorado miner's inches equals 2.60 second-feet.
100 Colorado miner's inches equals 19.5 United States gallons per second.
100 Colorado miner's inches equals 104 California miner's inches.
100 Colorado miner's inches for one day equals 5.17 acre-feet.
100 United States gallons per minute equals 0.223 second-foot.
100 United States gallons per minute for one day equals 0.442 acre-foot.
1,000,000 United States gallons per day equals 1.55 second-feet.
1,000,000 United States gallons equals 3.07 acre-feet.
1,000,000 cubic feet equals 22.95 acre-feet.
1 acre-foot equals 325,850 gallons.
1 inch deep on 1 square mile equals 2,323,200 cubic feet.
1 inch deep on 1 square mile equals 0.0737 second-foot per year.
1 foot equals 0.3048 meter.
1 mile equals 1.60935 kilometers.
1 mile equals 5,280 feet.
1 acre equals 0.4047 hectare.
1 acre equals 43,560 square feet.
1 acre equals 209 feet square, nearly.
1 square mile equals 2.59 square kilometers.
1 cubic foot equals 0.0283 cubic meter.
1 cubic foot equals 7.48 gallons.
1 cubic foot of water weighs 62.5 pounds.
1 cubic meter per minute equals 0.5886 second-foot.
1 horsepower equals 550 foot-pounds per second.
1 horsepower equals 76 kilogram-meters per second.
1 horsepower equals 746 watts.
1 horsepower equals 1 second-foot falling 8.80 feet.
1⅓ horsepower equals about 1 kilowatt.

To calculate water power quickly: $\frac{\text{Sec.-ft.} \times \text{fall in feet}}{11}$ = net horsepower on water wheel realizing 80 per cent of theoretical power.

EXPLANATION OF DATA

For each drainage basin there is given a brief general description covering such items as area, source, tributaries, topography, geology, forestation, rainfall, irrigation, storage, power, and other interesting or important facts.

For each regular current-meter gaging station the following data so far as available are given: Description of station, list of discharge measurements, table of daily gage heights, table of daily discharges,

table of monthly and yearly discharges and run-off. For stations located at weirs or dams the gage-height table is omitted.

In addition to statements regarding the location and installation of current-meter stations the descriptions give information in regard to any conditions which may affect the constancy of the relation of gage height to discharge, covering such points as ice, logging, shifting channels, and backwater; also information regarding diversions which decrease the total flow at the measuring section. Statements are also made regarding the accuracy and reliability of the data.

The discharge-measurement table gives the results of the discharge measurements made during the year, including the date, name of hydrographer, width and area of cross section, gage height, and discharge in second-feet.

The table of daily gage heights records the daily fluctuations of the surface of the river as found from the mean of the gage readings taken each day. At most stations the gage is read in the morning and in the evening. The gage height given in the table represents the elevation of the surface of the water above the zero of the gage. All gage heights affected by the presence of ice in the streams or by backwater from obstructions are published as recorded, with suitable footnotes. The rating table is not applicable for such periods unless the proper corrections to the gage heights are known and applied. Attention is called to the fact that the zero of the gage is placed at an arbitrary datum and has no relation to zero flow or the bottom of the river. In general, the zero is located somewhat below the lowest known flow, so that negative readings shall not occur.

The discharge measurements and gage heights are the base data from which rating tables, daily discharge tables, and monthly discharge tables are computed.

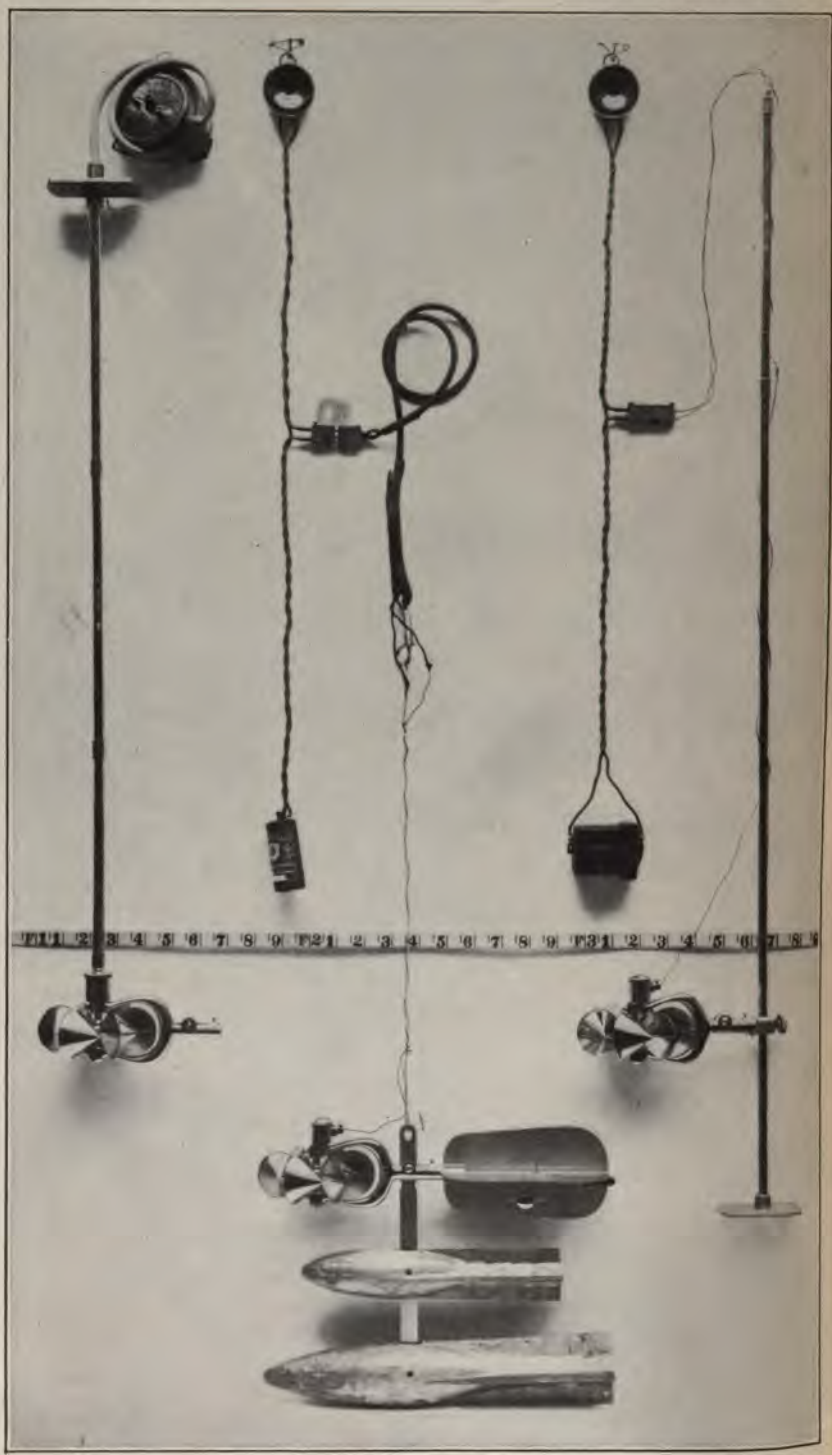
The rating table gives, either directly or by interpolation, the discharge in second-feet corresponding to every stage of the river recorded during the period for which it is applicable. It is not published in this report, but can be determined from the daily gage heights and daily discharges for the purpose of verifying the published results as follows:

First plot the discharge measurements for the current and earlier years on cross-section paper, with gage heights in feet as ordinates and discharge in second-feet as abscissas. Then tabulate a number of gage heights taken from the daily gage-height table for the complete range of stage given and the corresponding discharges for the days selected from the daily discharge table and plot the values on cross-section paper. The last points plotted will define the rating curve used and will lie among the plotted discharge measurements. After drawing the rating curve, a table can be developed by scaling off the discharge in second-feet for each tenth foot of gage height.

A. FOR BRIDGE MEASUREMENT.

B. FOR WADING MEASUREMENT.

TYPICAL GAGING STATIONS.



SMALL PRICE CURRENT METERS.

These values should be so adjusted that the first differences shall always be increasing or constant, except for known backwater conditions.

The table of daily discharges gives the discharges in second-feet corresponding to the observed gage heights as determined from the rating tables.

In the table of monthly discharge the column headed "Maximum" gives the mean flow, as determined from the rating table, for the day when the mean gage height was highest. As the gage height is the mean for the day, it does not indicate correctly the stage when the water surface was at crest height and the corresponding discharge was consequently larger than given in the maximum column. Likewise, in the column of "Minimum" the quantity given is the mean flow for the day when the mean gage height was lowest. The column headed "Mean" is the average flow in cubic feet for each second during the month. On this the computations for the remaining columns, which are defined on page 12, are based.

The field methods used in the collection of the data presented in this series of reports are described in the introductory sections of Water-Supply Papers 261 to 272, inclusive, "Surface water supply of the United States, 1909." Plate I shows typical gaging stations. Plate II shows the various types of current meters[1] used in the work.

ACCURACY AND RELIABILITY OF FIELD DATA AND COMPARATIVE RESULTS.

The accuracy of stream flow depends primarily on the natural conditions at the gaging station and on the methods and care with which the data are collected. Errors of the first group depend on the degree of permanency of channel and of permanency of the relation of discharge to stage. Errors of the second group are due, first, to errors in observation of stage; second, to errors in measurements of flow; and third, to errors due to misinterpretation of stage and flow data.

Practically all discharge measurements made under fair conditions are well within 5 per cent of the true discharge at the time of observation. Inasmuch as the errors of meter measurements are largely compensating, the mean rating curve, when well defined, is much more accurate than the individual measurements. Numerous experiments made to test the accuracy of current-meter work show that it compares very favorably with the results from standard weirs and, owing to simplicity of methods, usually gives results that are much

[1] See Hoyt, J. C., and others, Use and care of current meter as practiced by the United States Geological Survey; Trans. Am. Soc. Civil Eng., vol. 66, 1910, p. 70.

more reliable than those from stations at dams where the coefficient may be uncertain and conditions of flow are complicated.

The work is, of course, dependent on the reliability of the gage observers. With relatively few exceptions, the observers perform their work honestly. The records are, however, closely watched and the cause of any discrepancy is investigated. It is obvious that one gage reading a day does not always give the mean height for that day. As an almost invariable rule, however, errors from this source are compensating and virtually negligible in a period of one month, although a single day's reading may, when taken by itself, be considerably in error.

An effort is made to visit every station at least once each year for the purpose of making a measurement to determine the constancy of conditions of flow since the last measurement made in the preceding year, and also to check the elevation of the gage. On account of lack of funds or for other causes some stations were not visited during the current year. If conditions of flow have been reasonably permanent up to the time of the last preceding measurement, it is considered best to publish estimates of discharge based on the latest verified rating curve rather than to omit them altogether, although it should be distinctly understood that such records are at times subject to considerable error. This is also true, although to a less degree, of the period of records since the date of the last measurement of the current year. As a rule, the accuracy notes are based on the assumption that the rating curve used is strictly applicable to the current year.

In order to give engineers and others information regarding the probable accuracy of the computed results, footnotes are added to the daily-discharge tables, stating the probable accuracy of the rating tables used, and an accuracy column is inserted in the monthly-discharge table. For the rating tables "well defined" indicates, in general, that the rating is probably accurate within 5 per cent; "fairly well defined," within 10 per cent; "poorly defined" or "approximate," within 15 to 25 per cent. These notes are very general and are based on the plotting of the individual measurements with reference to the mean rating curve.

The accuracy column in the monthly-discharge table does not apply to the maximum or minimum nor to any individual day, but to the monthly mean. It is based on the accuracy of the rating, the probable reliability of the observer, and knowledge of local conditions. In this column A indicates that the mean monthly flow is probably accurate within 5 per cent; B, within 10 per cent; C, within 15 per cent; D, within 25 per cent. Special conditions are covered by footnotes.

USE OF THE DATA.

In general the base data which are collected in the field each year by the Survey engineers are published, not only to comply with the law, but also for the express purpose of giving to any engineer the opportunity of examining the computed results and of changing and adjusting them as may seem best to him. Although it is believed that the rating tables and computed monthly discharges are as good as the base data up to and including the current year will warrant, it should always be borne in mind that the additional data collected at each station from year to year nearly always throw new light on data already collected and published, and hence allow more or less improvement in the computed results of earlier years. It is therefore expected that the engineer who makes use of the figures presented in these papers will verify all ratings and make such adjustments for earlier years as may seem necessary. The work of compiling, studying, revising, and republishing data for different drainage basins for 5 or 10 year periods or more is carried on by the United States Geological Survey so far as the funds for such work are available.

The estimates in the table of monthly discharge are so arranged as to give only a general idea of the conditions of flow at the station, and it is not expected that they will be used for other than preliminary estimates.

The daily discharges are published to allow a more detailed study of the variation in flow and to determine the periods of deficient flow.

COOPERATIVE DATA.

Cooperative data of various kinds and data regarding the run-off at many stations maintained wholly by private funds are incorporated in the surface water-supply reports of the United States Geological Survey.

Many stations throughout the country are maintained for specific purposes by private parties who supply the records gratuitously to the United States Geological Survey for publication. When such records are furnished by responsible parties and appear to be reasonably accurate, they are verified, so far as possible, and estimated values of accuracy are given. As it is, however, impossible to verify completely all such records furnished—because of lack of funds or for other causes—they are published for what they are worth, as they are of value as a matter of record and afford at least approximate information regarding stream flow at the particular localities. The Survey does not, however, assume any responsibility for inaccuracies found in such records, although most of them are believed to be reasonably good. Records that are clearly worthless or misleading are not published.

COOPERATION AND ACKNOWLEDGMENTS.

The hydrographic work of the United States Geological Survey in California is being carried on in cooperation with the State in accordance with acts of the State legislature, approved March 16, 1903, March 20, 1905, March 11, 1907, and April 22, 1909.

The act of March 16, 1903, which covered the period from July 1, 1903, to June 30, 1905, is in substance as follows:

> The State board of examiners are hereby empowered to enter into contracts with the Director of the United States Geological Survey for the purpose of making topographic maps to the extent of twenty thousand dollars; also for the purpose of gaging streams, surveying reservoir sites and canal locations, for the conservation and utilization of the flood and storm waters of the State, to the extent of fifteen thousand dollars * * *.

The acts of March 20, 1905, and March 11, 1907, are in substance the same as the previous acts, the appropriations being increased to $30,000 for topography and $20,000 for hydrography and covering the four fiscal years July 1, 1905, to June 30, 1909. The act of April 22, 1909, appropriates $30,000 per annum for cooperation between the State and Federal Government for topography, hydrography, and use and distribution of water for agricultural purposes, this appropriation being made continuous.

Assistance has been rendered or records furnished by the following, to whom acknowledgment is due: Department of engineering of the State of California, Nathaniel Ellery, State engineer; James N. Gillett, governor; the United States Reclamation Service, for the records on Little Stony Creek near Lodoga, Cal., and in the Klamath River drainage basin in Oregon; the Kern County Land Co., through Mr. A. K. Warren, engineer in charge of water measurements, for the records of Kern River near Bakersfield; the Great Western Power Co., through Mr. H. H. Sinclair, general manager, for determinations of daily discharge on Feather River and tributaries.

Gage-height records have been furnished as follows: Santa Ynez River by the city of Santa Barbara, through Mr. Lee M. Hyde, supervising engineer for the board of water commissioners; Cottonwood Creek and flume by the Southern California Mountain Water Co.; San Joaquin River at Herndon by the Southern Pacific Co., through Mr. William Hood, chief engineer; Lagrange Water & Power Co.'s canal by Mr. Burton Smith, chief engineer of the Turlock irrigation district; Calaveras River by the United States Weather Bureau, through Mr. N. R. Taylor, local forecaster; North Fork of North Fork of Yuba River by Mr. John T. Mason; McCloud River by Mr. G. H. Lambson, superintendent of the United States Fishery; Sacramento River at Antler by Mr. C. H. Hamilton; Sacramento River at Castella by Mr. H. O. Wickes; Drews and Cottonwood creeks by Oregon Valley Land Co.; Rush Creek by Mr. Carl Peterson; Big Creek by Mr. John Lowery; South Fork of Merced

River by Mr. A. C. Leonard, park ranger; and South Fork of Tule River by the United States Indian Service, through Mr. A. P. Edmonson, Indian agent.

Stations located within or near the boundaries of national forests have been maintained in cooperation with the United States Forest Service, as noted in the descriptions of those stations.

DIVISION OF WORK.

The field work in California, except in the Klamath River basin, was carried on under the direction of W. B. Clapp by J. E. Stewart, W. V. Hardy, R. E. Haines, F. G. Wood, G. T. Peekema, H. J. Tompkins, T. W. Norcross, and H. D. McGlashan.

The ratings and special estimates were made by W. B. Clapp, F. F. Henshaw, and H. D. McGlashan. The computations were made and the completed data prepared for publication by G. C. Stevens, R. C. Rice, J. G. Mathers, H. D. Padgett, H. J. Dean, A. H. Tuttle, P. S. Monk, and M. I. Walters.

The field work in the Klamath River basin was carried on under the direction of W. W. Patch, project engineer, United States Reclamation Service, by J. C. Yadon and Leland Moser. The field data have been furnished by the United States Reclamation Service. The ratings and computations were made by F. F. Henshaw and E. S. Fuller.

The entire report was edited by Mrs. B. D. Wood.

GAGING STATIONS MAINTAINED IN PACIFIC COAST DRAINAGE BASINS IN CALIFORNIA.

The following list comprises the gaging stations regularly maintained in Pacific coast drainage basins in California by the United States Geological Survey and cooperative parties. Data for these stations have appeared in the published reports as shown in tables on pages 9 to 11. The stations are arranged by river basins and appear in downstream order, tributaries of main streams being indicated by indention. The stations are in California unless otherwise stated.

SOUTH PACIFIC OCEAN DRAINAGE BASINS.

Tia Juana River:
  Cottonwood Creek and Dulzura canal near Jamul, 1906–1910.
    Pine Valley Creek near Jamul, 1906–1908.
Sweetwater River near Descanso, 1906–1910.
San Diego River and San Diego flume near Lakeside, 1906–1910.
San Dieguito River:
  Santa Ysabel Creek near Escondido, 1906–1910.
San Luis Rey River near Pala, 1904–1910.
Santa Margarita River:
  Temecula Creek near Temecula, 1906.

Santa Ana River and Mentone Power Co.'s canal near Mentone, 1896–1910.
San Gabriel River and power canal near Azusa, 1896–1910.
Los Angeles River:
Arroyo Seco near Pasadena, 1910.
Malibu Creek near Calabasas, 1903–1906.
Triunfo Creek near Calabasas, 1903–1906.
Santa Ynez River near Santa Barbara, 1903–1910.
Santa Ynez River near Lompoc, 1906–1910.
Mono Creek near Santa Barbara, 1903–4.
Santa Maria River near Santa Maria, 1903–1905.
Salinas River near Salinas, 1900–1901.
Nacimiento River at Byron, February to April, 1901.
San Antonio River at Jylon, December, 1900, to April, 1901.
San Lorenzo Creek near Kings City, 1901-1903.
Arroyo Seco near Soledad, 1901–1910.

SAN FRANCISCO BAY DRAINAGE BASINS.

SAN JOAQUIN VALLEY.

San Joaquin River near Friant (Pollasky), 1907–1910.
San Joaquin River at Herndon, 1870–1910. (Gage height record only.)
Tulare Lake in Kings County, 1906–1910.
Kern River at Isabella, 1910.
Kern River near Bakersfield, 1893–1910.
Kern River, South Fork, at Isabella, 1910.
Tejon House Creek at Tejon ranch house, 1895–1896.
San Emidio Creek at San Emidio ranch house, 1894–1895.
White River:
Deer Creek at Hot Springs, 1910.
Tule River near Porterville, 1901–1910.
Tule River, South Fork, near Success, 1910.
Kaweah River below Three Rivers, 1903–1910.
Kaweah River, North Fork, at Kaweah, 1910.
Kings River near Sanger, 1895–1910.
Kings River at Kingsburg, 1895–1904.
Dinkey Creek near Ockenden, 1910.
Big Creek:
Rush Creek near Ockenden, 1910.
Fresno River near Fresno Flats, 1910.
North Fork Fresno River near Sugar Pine, 1910.
Merced River in Yosemite Valley, 1904–1909.
Merced River above Merced Falls, 1901–1910.
Tenaya Creek in Yosemite Valley, 1904–1909.
Yosemite Creek in Yosemite Valley, 1904–1909.
Merced River, South Fork, at Wawona, 1910.
Big Creek near Sugar Pine, 1910.
Tuolumne River at Hetch Hetchy Valley dam site, 1901.
Tuolumne River near Lagrange, 1895–1910.
Modesto Canal near Lagrange, 1903–1910.
Turlock Canal near Lagrange, 1899–1910.
Lagrange Water and Power Co.'s canal near Lagrange, 1907–1910.

an Joaquin River—Continued.
Tuolumne River at Modesto, 1895–1897.
Cherry Creek at Eleanor trail crossing, 1901.
Eleanor Creek at Eleanor trail crossing, 1901.
Jawbone Creek near Tuolumne, 1910.
Corral Creek near Groveland, 1910.
Tuolumne River, South Fork, near Groveland, 1910.
Clavey River near Tuolumne, 1910.
Indian Creek near Tuolumne, 1910.
Tuolumne River, North Fork, near Tuolumne, 1910.
Hunter Creek near Tuolumne, 1910.
Stanislaus River at Knights Ferry, 1895–1900, 1903–1910.
Rose Creek near Jupiter, 1910.
Knight Creek near Jupiter, 1910.
Stanislaus River, South Fork, near Columbia, 1910.
Stanislaus Water Co.'s canal at Knights Ferry, 1904–1910.
Calaveras River at Jenny Lind, 1907–1910.
Mokelumne River at Electra, 1901 and 1903–4.
Mokelumne River near Clements, 1904–1910.
Mokelumne River near Lodi, 1895.
Cosumnes River at Michigan Bar, 1907–1910.

SACRAMENTO VALLEY.

Sacramento River at Castella, 1910.
Sacramento River at Antler, 1910.
Sacramento River at Jellys Ferry, near Red Bluff, 1895–1902.
Sacramento River at Iron Canyon, near Red Bluff, 1902–1910.
Sacramento River at Collinsville, 1878–1885.
Sacramento River at Sacramento, 1904–5 (gage heights only).
Pit River near Canby, 1904–5.
Pit River near Bieber, 1904–1908.
Pit River at Henderson, 1910.
Pit River at Silverthorne Ferry, near Ydalpom, 1910.
Cottonwood Creek (tributary to Goose Lake) near Lakeview, Oreg., 1908–1910.
Drews Creek (tributary to Goose Lake) near Lakeview, Oreg. 1909–1910.
Pit River, South Fork, near Ivy, 1904–5.
West Valley Creek near Likely, 1904–5.
Ash Creek at Adin, 1904–5.
Hat Creek at Hat Creek, 1910.
Kosk Creek near Henderson, 1910.
McCloud River near Gregory, 1902–1908.
McCloud River at Baird, 1910.
Cottonwood Creek:
Cottonwood Creek, North Fork, at Ono, 1907–1910.
Mill Creek near Los Molinos, 1909–1910.
Stony Creek near Fruto, 1901–1910.
Little Stony Creek near Lodoga, 1907–1910.
Feather River, North Fork, above Prattville, 1905–1907.
Feather River, North Fork, below Prattville, 1905–1910.
Feather River, North Fork, near Big Bend, 1905–1910.
Feather River at Oroville, 1902–1910.
Hamilton Branch near Prattville, 1905–1909.

Sacramento River—Continued.
Feather River—Continued.
Butt Creek at Butte Valley, 1905–1910.
Indian Creek near Crescent Mills, 1905–1909.
Feather River, Middle Fork, at Cromberg, 1910.
Grizzly Creek near Beckwith, 1906.
Yuba River, Middle Fork[1] (head of Yuba River), near North San Juan, 1900 and 1910.
Yuba River near Smartsville, 1903–1910.
Yuba River at Parks Bar Bridge, near Smartsville, 1900.
Oregon Creek near North San Juan, 1910.
Yuba River, North Fork,[2] at Goodyear Bar, 1910.
Yuba River, North Fork,[2] near North San Juan, 1900.
Yuba River, North Fork of North Fork,[3] at Downieville, 1910.
Rock Creek at Goodyear Bar, 1910.
Goodyear Creek at Goodyear Bar, 1910.
Bear River at Van Trent, above Wheatland, 1904–1910.
American River near Fairoaks, 1904–1910.
Cache Creek at Lower Lake, 1901–1910.
Cache Creek near Yolo, 1903–1910.
Putah Creek near Guenoc, 1904–1906.
Putah Creek at Winters, 1905–1910.

NORTH PACIFIC OCEAN DRAINAGE BASINS.

Russian River at Geyserville, 1910.
South Eel River at Hearst, 1910.
Eel River at Scotia, 1910.
Mad River near Arcata, 1910.
Sprague River (head of Klamath River) at Yainax, Oreg., 1904.
Upper Klamath Lake (on Klamath River) near Klamath Falls, Oreg., 1904–1910.
Link River (continuation of Klamath River between Upper Klamath Lake and Lake Ewauna) at Klamath Falls, Oreg., 1904–1910.
Lower Klamath Lake near Brownell, 1907–1909.
Klamath River at Keno, Oreg., 1904–1910.
Klamath River near Requa, 1910.
Sycan River near Silverlake, Oreg., 1905.
Williamson River at Klamath Agency, Oreg., 1909–1910.
Lost River at Clear Lake, 1904–1909.
Lost River at Olene, Oreg., 1907–1910.
Lost River near Merrill, Oreg., 1904–1908.
Tule Lake near Merrill, Oreg., 1904–1910.
Miller Creek near Lorella, Oreg., 1904–1910.
Scott River:
Scott River, East Fork, near Callahan, 1910.
Trinity River near Trinity Center, 1910.
Coffee Creek near Coffee, 1910.
Trinity River, East Fork, near Trinity Center, 1910.
Swift Creek near Trinity Center, 1910.

[1] Known locally as Middle Yuba River.
[2] Known locally as North Yuba River.
[3] Known locally as North Fork of North Yuba River.

SOUTH PACIFIC OCEAN DRAINAGE BASINS.

GENERAL FEATURES.

The South Pacific Ocean drainage basins include all streams south of San Francisco Bay that drain the western slope of the Coast Range and enter the Pacific either directly or indirectly. The average width of the region thus drained is nearly 50 miles and its total area is 23,000 square miles. The low-water flow of the streams of this area is very small, and in many of them all the water disappears in the sand and gravel beds below the canyons. In the winter, however, the streams are torrential and discharge large volumes of water. North of Santa Barbara the general course of the streams is northwestward; south of Santa Barbara, however, which is approximately opposite the intersection of the Coast Range by the Tehachapi Range, the general direction is southwestward.

TIA JUANA RIVER BASIN.

COTTONWOOD CREEK AND DULZURA CANAL NEAR JAMUL, CAL.

Tia Juana River discharges into the Pacific Ocean below San Diego Bay, near the Mexican boundary. Its principal tributary, Cottonwood Creek, rises in the Laguna Mountains of the Coast Range, and flows south and west for about 20 miles, where it is joined by Pine Valley Creek from the north; it then flows southwestward 12 miles to its junction with Tia Juana River at the Mexican boundary, about 22 miles east of the coast line. The total drainage area of Cottonwood Creek above its junction with Tia Juana River is approximately 340 square miles. It lies south of the Sweetwater and Otay River basins and is the most southerly stream in San Diego County. Pine Valley Creek is its only important tributary.

The gaging station, which was established December 14, 1905, is at the Barrett dam site, in SW. ¼ sec. 15, T. 17 S., R. 3 E., 6 miles above the San Diego Campo road, and 12 miles east of Jamul.

Pine Valley Creek enters Cottonwood Creek 1 mile and Lyons Creek half a mile above the gaging station. The drainage area above the station, including Pine Valley Creek, is 270 square miles.

The Southern California Mountain Water Co. diverts water from Pine Valley and Cottonwood creeks about half a mile above their junction, by way of Dulzura canal (13.4 miles long) to the headwaters of Dulzura Creek, whence it flows 12 miles to lower Otay reservoir, which supplies water to the city of San Diego. The capacity of the canal is about 60 second-feet. The amount diverted is measured in the diversion flume about 1½ miles below the intake and one-fourth mile below the station on Cottonwood Creek. A staff gage is located at the measuring section in the flume.

Several gages with independent datums have been installed at this station. Two vertical staff gages are now used. The upper one is on the left bank near the end of the dam and reads the depth of the water on the crest of the dam. The lower gage is on the upstream side of the dam near the right bank, and its datum is 2.50 feet lower. Gage heights for 1909 and 1910 are referred to lower gage datum.

Discharge measurements to determine the excess water not diverted to the lower Otay reservoir are made at the low concrete dam, back of which sand and gravel have been deposited to the level of its crest. At low stages the flow is restricted to a rectangular wooden opening through the wall of the dam, but at high stages the flow is over the entire length of the dam, which is 61 feet. Measurements are made by wading, except at high water, when floats are used.

The gage height records are furnished by the Southern California Mountain Water Co. The results obtained are only fair.

Discharge measurements of Cottonwood Creek and Dulzura canal near Jamul, Cal., 1910.

Creek.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	W. V. Hardy	8	2.8	0.50	5.7
Mar. 13	do	5	1.4	.31	2.2
June 5	do	1	.3	.10	.4

Canal.

Jan. 25	W. V. Hardy	4.8	2.4	0.45	0.9
Do.	do	4.8	2.8	.49	1.1
Do.	do	4.8	3.4	.62	2.3
Do.	do	4.8	4.8	.94	6.1
Do.	do	4.8	6.3	1.26	12
Do.	do	4.8	7.8	1.56	18
Do.	do	4.8	11	2.23	26
Do.	do	4.8	13	2.75	38
Do.	do	4.8	16	3.28	48
Do.	do	4.8	17	3.50	53
Mar. 13	do	4.8	9	1.85	19
June 5	do	4.9	1.0	.37	.8

Daily gage height, in feet, of Cottonwood Creek near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]2.40	0.44	0.40	2.35	0.16	0.09	0.02	.....	.....	.....	0.22	0.29
2	1.60	.40	.39	2.15	.16	.11	.02	.....	.....	.....	.26	.29
3	1.90	.41	.39	2.05	.15	.11	.02	.....	.....	.....	.35	.28
4	1.25	.44	.39	1.40	.22	.11	.01	.....	.....	.....	.45	.28
5	2.50	.42	.35	.55	.21	.09	.00	.....	.....	.....	.35	.31
6	1.95	.42	.35	.42	.28	.08	.....	.....	.....	.....	.29	.31
7	1.55	.42	.38	.41	.30	.09	.....	.....	.....	.....	.29	.29
8	1.40	.39	.31	.38	.28	.08	.....	.....	.....	.....	.29	.29
9	1.30	.34	.36	.38	.19	.06	.....	.....	.....	.....	.29	.29
10	1.05	.32	.35	.35	.18	.05	.....	.....	.....	.....	.26	.29
11	1.20	.36	.34	.32	.18	.05	.....	.....	.....	.....	.26	.28
12	1.25	.32	.31	.40	.16	.05	.....	.....	.....	.....	.29	.26
13	.90	.31	.31	.39	.18	.05	.....	.....	.....	.....	.35	.26
14	1.30	.32	.32	.31	.18	.05	.....	.....	.....	.....	.58	.29
15	1.55	.34	.32	.30	.19	.18	.....	.....	.....	.....	.44	.26

[a] Maximum, 3.8 feet. Corresponding discharge, 695 second-feet.

aily gage height, in feet, of Cottonwood Creek near Jamul, Cal., for 1910—Continued.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	3.00	0.33	0.32	0.31	0.19	0.18	.....	.....	.....	.....	0.38	0.26
.....	2.85	.30	.35	.29	.18	.18	.....	.....	.....	.....	.32	.28
.....	1.90	.32	.42	.29	.19	.11	.....	.....	.....	.....	.30	.28
.....	1.65	.42	.35	.22	.16	.09	.....	.....	.....	0.02	.39	.29
.....	1.35	1.25	.32	.22	.19	.08	.....	.....	.....	.04	.31	.35
.....	.95	.82	.32	.22	.18	.02	.....	.....	.....	.08	.36	.30
.....	.80	.45	.32	.22	.18	.08	.....	.....	.....	.06	.30	.30
.....	.61	.40	.32	.19	.15	.06	.....	.....	.....	.12	.29	.29
.....	.50	.40	.32	.55	.14	.06	.....	.....	.....	.11	.29	.29
.....	.58	.41	.38	.20	.14	.06	.....	.....	.....	.09	.29	.28
.....	.50	.40	.62	.20	.12	.05	.....	.....	.....	.11	.32	.32
.....	.46	.40	.90	.16	.12	.02	.....	.....	.....	.12	.30	.26
.....	.45	.35	2.40	.20	.09	.02	.....	.....	.....	.15	.30	.28
.....	.41	.....	2.15	.16	.12	.02	.....	.....	.....	.18	.30	.25
.....	.42	.....	1.70	.15	.09	.02	.....	.....	.....	.20	.31	.25
.....	.40	.....	1.75	.....	.08	.....	.....	.....	.....	.21	.....	.31

NOTE.—No water in creek from July 4 to Oct. 18.

Daily discharge, in second-feet, of Cottonwood Creek near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	69	4.8	4.0	65	0.8	0.4	0.1	.....	.....	.....	1.3	2.2
2	33	4.0	3.8	54	.8	.5	.1	.....	.....	.....	1.8	2.2
3	43	4.2	3.8	49	.7	.5	.1	.....	.....	.....	3.1	2.1
4	23.4	4.8	3.8	27.3	1.3	.5	.0	.....	.....	.....	5.0	2.1
5	78	4.4	3.1	7.0	1.2	.4	.0	.....	.....	.....	3.1	2.5
6	45	4.4	3.1	4.4	2.1	.3	.....	.....	.....	.....	2.2	2.5
7	31.5	4.4	3.6	4.2	2.3	.4	.....	.....	.....	.....	2.2	2.2
8	27.3	3.8	2.5	3.6	2.1	.3	.....	.....	.....	.....	2.2	2.2
9	24.7	3.0	3.3	3.6	1.0	.2	.....	.....	.....	.....	2.2	2.2
10	18.3	2.6	3.1	3.1	1.0	.2	.....	.....	.....	.....	1.8	2.2
11	22.1	3.3	3.0	2.6	1.0	.2	.....	.....	.....	.....	1.8	2.1
12	23.4	2.6	2.5	4.0	.8	.2	.....	.....	.....	.....	2.2	1.8
13	14.7	2.5	2.5	3.8	1.0	.2	.....	.....	.....	.....	3.1	1.8
14	24.7	2.6	2.6	2.5	1.0	.2	.....	.....	.....	.....	7.7	2.2
15	31.5	3.0	2.6	2.3	1.0	1.0	.....	.....	.....	.....	4.8	1.8
16	190	2.8	2.6	2.5	1.0	1.0	.....	.....	.....	.....	3.6	1.8
17	145	2.3	3.1	2.2	1.0	1.0	.....	.....	.....	.....	2.6	2.1
18	43	2.6	4.4	2.2	1.0	.5	.....	.....	.....	.....	2.3	2.1
19	34.5	4.4	3.1	1.3	.8	.4	.....	.....	.....	0.1	3.8	2.2
20	26	23.4	2.6	1.3	1.0	.3	.....	.....	.....	.2	2.5	3.1
21	15.9	12.9	2.6	1.3	1.0	.1	.....	.....	.....	.3	3.3	2.3
22	12.5	5.0	2.6	1.3	1.0	.3	.....	.....	.....	.2	2.3	2.3
23	8.3	4.0	2.6	1.0	.7	.2	.....	.....	.....	.5	2.2	2.2
24	6.0	4.0	2.6	7.0	.7	.2	.....	.....	.....	.5	2.2	2.2
25	7.7	4.2	3.6	1.1	.7	.2	.....	.....	.....	.4	2.2	2.1
26	6.0	4.0	8.5	1.1	.5	.2	.....	.....	.....	.5	2.6	2.6
27	5.2	4.0	14.7	0.8	.5	.1	.....	.....	.....	.5	2.3	1.8
28	5.0	3.1	69	1.1	.4	.1	.....	.....	.....	.8	2.3	2.1
29	4.2	.....	54	.8	.5	.1	.....	.....	.....	1.0	2.3	1.7
30	4.4	.....	36	.7	.4	.1	.....	.....	.....	1.1	2.5	1.7
31	4.0	.....	37.5	.....	.3	.....	.....	.....	.....	1.2	.....	2.5

NOTE.—No water in the creek from July 4 to Oct. 18. Daily discharge determined from a rating curve (the same as that for 1909) fairly well defined below discharge of 55 second-feet.

Monthly discharge of Cottonwood Creek near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	190	4.0	33.1	2,040	C.
February	23.4	2.3	4.68	260	B.
March	69	2.5	9.57	588	B.
April	65	.7	8.74	520	B.
May	2.3	.3	.95	58	C.
June	1.0	.1	.34	20	C.
July	.1	.0	.01	1	D.
August	.0	.0	.00	0	
September	.0	.0	.00	0	
October	1.2	.0	.24	15	C.
November	7.7	1.3	2.78	165	B.
December	3.1	1.7	2.16	133	B.
The year	190	.0	5.25	3,800	

Daily gage height, in feet, of Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	1.85	3.0	2.2	.....	1.2	0.3	16	3.65	2.5	1.9	2.1	0.82	.....
2	.....	3.35	2.15	.....	1.3	.32	17	3.6	2.3	2.1	1.9	.7	.....
3	1.6	3.0	2.1	.....	1.3	.32	18	3.5	2.4	2.6	1.85	.65	.....
4	3.4	2.75	2.05	1.3	1.25	.32	19	3.7	2.6	2.4	1.7	.65	.....
5	3.35	2.85	2.0	2.65	1.15	.34	20	3.65	3.5	2.2	1.65	.85	.....
6	3.6	2.7	2.0	2.8	1.1	.3	21	3.7	2.8	2.0	1.65	.8	.....
7	3.8	2.7	2.0	2.7	.98	.3	22	3.7	2.8	2.2	1.5	.75	.....
8	3.7	2.75	2.0	2.5	.92	.3	23	3.7	2.7	2.4	1.45	.7	.....
9	3.7	2.75	2.1	2.4	.9	.26	24	3.7	2.5	2.1	.65	.6	.....
10	3.7	2.7	1.9	2.4	.9	.2	25	3.4	2.6	2.3	1.25	.55	.....
11	3.65	2.55	1.8	2.4	.88	.15	26	3.4	2.4	3.65	1.15	.55	.....
12	3.7	2.5	1.8	3.2	.8	.15	27	3.25	2.4	3.4	1.05	.52	.....
13	3.55	2.45	1.8	3.0	.8	.12	28	3.15	2.25	3.55	1.15	.45	.....
14	3.45	2.45	1.75	2.55	.8	.15	29	3.15	.....	3.6	1.15	.41	.....
15	3.5	2.6	1.85	2.3	.85	.....	30	3.05	.....	3.6	1.2	.28	.....
							31	2.9	.....	3.65	.....	.32	.....

NOTE.—No water diverted through canal on days of no gage height, or from June 15 to Dec. 26.

Daily discharge, in second-feet, of Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Dec.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Dec.
1	20.6	42	26.6	0.0	10.3	0.4	.....	16	55	32.1	21.5	24.9	4.8	.....	.....
2	.0	49	25.7	.0	11.8	.5	.....	17	54	28.4	24.9	21.5	3.2	.....	.....
3	16.6	42	24.9	.0	11.8	.5	.....	18	52	30.2	34	20.6	2.6	.....	.....
4	50	37	24	11.8	11.0	.5	.....	19	56	34	30.2	18.2	2.6	.....	.....
5	49	39	23.2	35	9.5	.5	.....	20	55	52	26.6	17.4	5.2	.....	.....
6	54	36	23.2	38	8.8	.4	.....	21	56	38	23.2	17.4	4.5	.....	.....
7	58	36	23.2	36	7.0	.4	.....	22	56	38	26.6	15.0	3.8	.....	.....
8	56	37	23.2	32.1	6.2	.4	.....	23	56	36	30.2	14.2	3.2	.....	.....
9	56	37	24.9	30.2	5.9	.3	.....	24	56	32.1	24.9	2.6	2.1	.....	.....
10	56	36	21.5	30.2	5.9	.2	.....	25	50	34	28.4	11.0	1.6	.....	.....
11	55	33	19.8	30.2	5.6	.2	.....	26	50	30.2	55	9.5	1.6	.....	.....
12	56	32.1	19.8	26.6	4.5	.2	.....	27	47	30.2	50	8.0	1.4	.....	0.4
13	53	31.1	19.8	42	4.5	.1	.....	28	45	27.5	53	9.5	.9	.....	.4
14	51	31.1	19.0	33	4.5	.2	.....	29	45	.....	54	9.5	.7	.....	.4
15	52	34	20.6	28.4	5.2	.....	.....	30	43	.....	54	10.3	.4	.....	.4
								31	40	.....	55	.....	.4	.....	.4

NOTE.—No water diverted from June 15 to Dec. 26. The daily discharges were obtained from a rating curve well defined between 0.7 second-foot and 54 second-feet.

Monthly discharge of Dulzura canal near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
	58	0.0	48.4	2,980	A.
r	52	27.5	35.5	1,970	A.
	55	19	30.0	1,840	A.
	42	.0	19.4	1,150	A.
	11.8	.4	4.89	301	A.
15)	.5	.0	.32	10	B.
ıe period				8,250	

Discharge, in second-feet, of Cottonwood Creek and Dulzura canal near Jamul, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Oct.	Nov.	Dec.
	90	47	31	65	11	0.8	0.1		1.3	2.2
	33	53	30	54	13	.9	.1		1.8	2.2
	61	46	29	49	12	.9	.1		3.1	2.1
	73	42	28	39	12	.9			5.0	2.1
	127	43	26	42	11	.9			3.1	2.5
	99	40	26	42	11	.7			2.2	2.5
	90	40	27	40	9.3	.8			2.2	2.2
	83	41	26	36	8.3	.7			2.2	2.2
	81	40	28	34	6.9	.6			2.2	2.2
	74	39	25	33	6.9	.4			1.8	2.2
	77	36	23	33	6.6	.4			1.8	2.1
	79	35	22	31	5.3	.4			2.2	1.8
	68	34	22	46	5.5	.3			3.1	1.8
	76	34	22	36	5.5	.4			7.7	2.2
	84	37	23	31	6.2	1.0			4.8	1.8
	245	35	24	27	5.8	1.0			3.6	1.8
	199	31	28	24	4.2	1.0			2.6	2.1
	95	33	38	23	3.6	.5			2.3	2.1
	90	38	33	20	3.4	.4		0.1	3.8	2.2
	81	75	29	19	6.2	.3		.2	2.5	3.1
	72	51	26	19	5.5	.1		.3	3.3	2.3
	68	43	29	16	4.8	.3		.2	2.3	2.3
	64	40	33	15	3.9	.2		.5	2.2	2.2
	62	36	28	9.6	2.8	.2		.5	2.2	2.2
	58	38	32	12	2.3	.2		.4	2.2	2.1
	56	34	64	11	2.1	.2		.5	2.6	2.6
	52	34	65	8.8	1.9	.1		.5	2.3	2.2
	50	31	122	11	1.3	.1		.8	2.3	2.5
	49		108	10	1.2	.1		1.0	2.3	2.1
	47		90	11	.8	.1		1.1	2.5	2.1
	44		92		.7			1.2		2.9

Monthly discharge of Cottonwood Creek and Dulzura canal near Jamul, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	245	33	81.5	5,010
February	75	31	40.2	2,220
March	122	22	39.6	2,430
April	65	8.8	28.2	1,680
May	13	.7	5.84	359
June	1	.1	.50	30
July	.1	.0	.01	1
August	.0	.0	.00	0
September	.0	.0	.00	0
October	1.2	.0	.24	15
November	7.7	1.3	2.78	165
December	3.1	1.8	2.20	135
The year	245	.0	16.7	12,100

SWEETWATER RIVER BASIN.

SWEETWATER RIVER NEAR DESCANSO, CAL.

Sweetwater River rises in the south and east slope of the Cuyamaca Mountains of the Coast Range, flows nearly due south for a distance of 15 miles, then turns to the west and southwest and discharges into San Diego Bay south of National City. Its length is 45 miles and its area comprises approximately 215 square miles, the greater part of which is in mountainous country. The basin is extremely narrow. It lies directly south of San Diego River and north of the Otay and Cottonwood Creek basins.

A record of run-off kept at the Sweetwater reservoir from 1888 to 1905 by the San Diego Land & Town Co. was published in Water-Supply Paper 251, 1910, page 106.

The gaging station, which is located at the Ellis ranch, 1½ miles below Descanso post office, in the SE. ¼ sec. 25, T. 15 S., R. 3 E., was established November 21, 1905.

Guatay Creek enters the river from the east about 2 miles above the gaging station. About one-fourth second-foot of water is diverted above the station for irrigation on the Ellis ranch. About 20 miles below water for irrigation is pumped from wells along the banks of the stream.

The staff gage is in three sections on the left bank. No change has been made in the datum of the gage since the station was established. Discharge measurements are made from a cable or by wading near the gage.

Discharge for 1910 was estimated by the indirect method for shifting channels and from rating tables covering short periods. The record may be considered fair.

Discharge measurements of Sweetwater River near Descanso, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
an. 23	W. V. Hardy	22	11	4.20	32
27	do	20	8	4.10	22
eb. 14	do	17	6.3	3.95	12
17	do	17	6	3.93	13
ar. 3	do	17	5.1	3.94	9.2
4	do	17	5.1	3.92	8.8
12	do	17	4.4	3.88	6.7
14	do	8	3.4	3.86	7.6
pr. 2	do	17	8	4.02	17
3	do	17	8	4.12	20
26	do	10	3.2	4.10	6.7
ay 7	do	8	2.8	4.08	5.7
24	do	6	2.4	3.98	4.6
26	do	7	2.1	3.92	3.4
ne 4	do	4	1.2	3.84	2.4
25	do	3	.9	3.68	1.2
ept. 18	C. C. Jacob	1.3	.36	3.59	.34
ov. 16	W. V. Hardy	2	.8	3.55	1.3

NOTE.—All measurements were made by wading near the gage.

Daily gage height, in feet, of Sweetwater River near Descanso, Cal., for 1910.

[Chas. H. Ellis, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.05	4.08	.....	4.17	4.11	3.82	3.64	.....	3.53	3.52	3.56	3.48
2	4.75	4.08	.....	4.12	4.11	3.81	3.64	.....	3.53	3.52	3.56	3.48
3	4.85	4.02	3.94	4.12	4.14	3.81	3.64	.....	3.53	3.51	3.60	3.48
4	4.60	4.00	3.94	4.10	4.13	3.81	3.64	.....	3.53	3.51	3.54	3.48
5	4.54	4.00	.....	4.08	4.13	3.79	3.64	.....	3.52	3.51	3.54	3.48
6	4.39	4.00	3.91	4.06	4.11	3.79	3.64	.....	3.51	3.51	3.52	3.48
7	4.32	4.00	3.91	4.06	4.11	3.78	3.64	.....	3.51	3.51	3.52	3.48
8	4.25	4.00	3.91	4.06	4.09	3.78	3.64	.....	3.51	3.51	3.52	3.48
9	4.20	3.99	3.91	4.06	4.07	3.77	3.64	.....	3.51	3.51	3.52	3.48
10	4.20	3.99	3.91	4.04	4.04	3.76	3.64	.....	3.51	3.51	3.52	3.49
11	4.19	3.98	3.90	4.11	4.02	3.76	3.64	.....	3.50	3.51	.....	3.50
12	4.16	3.97	3.89	4.21	4.00	3.75	3.64	.....	3.50	3.51	.....	3.50
13	4.15	3.97	3.88	4.14	4.00	3.74	3.67	.....	3.52	3.52	.....	3.49
14	4.15	3.96	3.92	4.09	4.00	3.72	3.66	3.54	3.55	3.58	.....	3.50
15	4.40	3.96	3.92	4.06	4.00	3.71	3.64	3.54	3.52	3.72	.....	3.50
16	4.95	3.94	3.90	4.01	4.00	3.70	3.64	3.54	3.50	3.68	3.55	3.50
17	4.6	3.94	3.93	3.99	4.00	3.70	3.64	3.54	3.59	3.61	3.52	3.50
18	4.58	3.92	3.94	3.97	4.00	3.70	3.64	3.54	3.59	3.59	3.52	3.50
19	4.52	4.02	3.91	3.95	4.00	3.69	3.64	3.54	3.59	3.56	3.52	3.54
20	4.45	4.15	3.88	3.97	3.99	3.68	3.62	3.54	3.59	3.55	3.52	3.64
21	4.35	4.00	3.84	3.99	3.97	3.68	3.62	3.54	3.59	3.54	3.52	3.60
22	4.20	3.93	3.91	3.98	3.96	3.68	3.62	3.54	3.59	3.54	3.52	3.56
23	4.20	3.92	3.94	3.96	3.95	3.68	3.62	3.54	3.59	3.54	3.50	3.52
24	4.18	3.92	3.86	3.95	3.94	3.68	3.61	3.54	3.59	3.54	3.50	3.50
25	4.12	3.93	4.04	3.97	3.92	3.67	3.61	3.54	3.59	3.54	3.50	3.52
26	4.10	3.93	4.12	3.99	3.92	3.66	3.61	3.54	3.59	3.54	3.50	3.53
27	4.10	3.93	4.12	4.01	3.88	3.66	3.60	3.54	3.59	3.54	3.50	3.51
28	4.09	3.93	4.35	4.01	3.87	3.66	3.62	3.53	3.57	3.54	3.50	3.50
29	4.06	.....	4.22	4.09	3.86	3.66	3.62	3.53	3.55	3.56	3.50	3.49
30	4.04	.....	4.20	4.11	3.84	3.66	3.62	3.53	3.54	3.56	3.50	3.49
31	4.02	.....	4.18	.....	3.82	.....	3.62	3.53	.....	3.56	.....	3.48

Daily discharge, in second-feet, of Sweetwater River near Descanso, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	479	19	10	25	6.0	2.3	0.7	0.4	0.1	0.1	1.5	2.0
2	116	19	10	20	6.0	2.2	.7	.4	.1	.1	1.5	2.0
3	138	16	10	20	7.0	2.2	.7	.4	.1	.05	2.0	2.0
4	88	15	10	19	7.0	2.2	.7	.4	.1	.05	1.5	2.0
5	78	15	9.0	17	7.0	2.0	.7	.4	.1	.05	1.5	2.0
6	56	15	8.0	16	6.0	2.0	.7	.4	.05	.05	1.0	2.0
7	47	15	8.0	15	6.0	1.9	.7	.3	.05	.05	1.0	2.0
8	38	15	8.0	15	6.0	1.9	.7	.3	.05	.05	1.0	2.0
9	32	14	8.0	14	6.0	1.8	.7	.3	.05	.05	1.0	2.0
10	32	14	8.0	13	5.0	1.7	.7	.3	.05	.05	1.0	2.0
11	31	14	8.0	15	4.9	1.7	.7	.3	.0	.05	1.0	2.5
12	27	13	7.0	19	4.6	1.6	.7	.3	.0	.05	3.0	2.5
13	26	13	7.0	15	4.6	1.5	.9	.3	.1	.1	2.0	2.5
14	26	13	8.0	13	4.6	1.3	.8	.2	.2	.3	4.0	2.5
15	57	13	9.0	11	4.6	1.2	.7	.2	.1	3.0	3.0	2.5
16	160	13	9.0	9.0	4.6	1.1	.7	.2	.0	2.5	1.3	2.5
17	88	13	10	9.0	4.6	1.1	.7	.2	.4	2.0	1.0	2.5
18	85	12	11	9.0	4.6	1.1	.7	.2	.4	1.5	1.0	2.5
19	75	16	10	8.0	4.6	1.0	.7	.2	.4	1.5	1.0	3.0
20	64	22	10	8.0	4.5	1.0	.5	.2	.4	1.5	1.0	5.0
21	50	14	9.0	7.0	4.2	1.0	.5	.2	.4	1.5	1.0	4.0
22	32	12	11	7.0	4.0	1.0	.5	.2	.4	1.5	1.0	3.5
23	32	11	12	6.0	3.9	1.0	.5	.2	.4	1.5	1.5	3.0
24	30	11	10	6.0	3.8	1.0	.5	.2	.4	1.5	1.5	3.0
25	22	11	17	5.0	3.5	.9	.5	.2	.4	1.5	1.5	3.0
26	20	11	21	5.0	3.5	.8	.5	.2	.4	1.5	1.5	3.0
27	20	11	21	5.0	3.0	.8	.4	.2	.4	1.5	1.5	3.0
28	19	10	39	5.0	2.9	.8	.5	.1	.3	1.5	1.5	3.0
29	18	.....	28	6.0	2.8	.8	.5	.1	.2	1.5	1.5	3.0
30	17	.....	27	6.0	2.5	.8	.5	.1	.2	1.5	1.5	3.0
31	16	.....	26	.....	2.3	.....	.5	.1	.....	1.5	.....	3.0

NOTE.—Daily discharges determined from rating curves applicable as follows: Jan. 1 to Feb. 14, 1910, poorly defined; Feb. 15 to Mar. 2, indirect method for shifting channels; Mar. 3 to Mar. 12, poorly defined; Mar. 13 to Apr. 25, indirect method for shifting channels; Apr. 26 to Oct. 15, fairly well defined; Oct. 16 to Dec. 31, indirect method for shifting channels.

Monthly discharge of Sweetwater River near Descanso, Cal., for 1910.

[Drainage area, 40 square miles.]

Month.	Discharge in second-feet.				Run-on.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	479	16	65.1	1.63	1.88	4,000	C.
February	22	10	13.9	.348	.36	772	C.
March	39	7	12.9	.322	.37	793	C.
April	25	5	11.6	.290	.32	690	C.
May	7	2.3	4.66	.116	.13	287	C.
June	2.3	.8	1.39	.035	.04	83	C.
July	.9	.4	.63	.016	.02	39	C.
August	.4	.1	.25	.006	.007	15	C.
September	.4	.0	.208	.005	.006	12	C.
October	3	.05	.955	.024	.03	59	C.
November	4	1	1.51	.038	.04	90	C.
December	5	2	2.66	.066	.08	164	C.
The year	479	.0	9.68	.242	3.28	7,000	

SAN DIEGO RIVER BASIN.

SAN DIEGO RIVER AND FLUME NEAR LAKESIDE, CAL.

San Diego River rises in the Cuyamaca Mountains on the western slope of the Coast Range and flows in a southwesterly direction, discharging into Pacific Ocean through False Bay at the northern boundary of San Diego City. Its length is about 50 miles, half of which lies in the mountains above the town of Lakeside. The San Diego basin lies directly south of the Santa Ysabel basin and north of Sweetwater River basin.

The San Diego has several small tributaries, the most important being Coleman, Cedar, Boulder, South Fork, and Chocolate creeks, all of which enter from the east and south above Lakeside. San Vicente Creek, the only important tributary from the north, enters the river at Lakeside.

The gaging station, which is located about 1 mile above the San Diego, Cuyamaca & Eastern Railway station, at crossing of the road from Lakeside to Padre Barona Valley, on the El Cajon land grant, was established December 3, 1905.

Chocolate Creek enters the river from the south 7 miles above, and San Vicente Creek from the north 1 mile below the gaging station. The drainage area at this point is 208 square miles.

The San Diego flume diverts water from the river at a point one-half mile below the junction of Boulder Creek and about 15 miles above the gaging station. This flume diverts all the low flow of the river and a sufficient amount of the winter flow to fill La Mesa storage reservoir. The present capacity of the flume is about 16 second-feet. In addition, there are five pumping plants, located from 1 to 3 miles above the station, that obtain water for irrigation from wells along the banks of the stream. Their capacity ranges from about one-half to 2½ second-feet. There are several similar pumping plants below the station.

The staff gage is in three sections on the left bank at the cable from which discharge measurements are made. The gage datum has remained unchanged since the station was established.

The gaging station on the San Diego flume is located at the trestle crossing at Los Coches Creek, 3½ miles southeast of Lakeside. The gage heights are furnished by the San Diego Flume Co.

The conditions at the river station are extremely bad for procuring accurate estimates of discharge. The channel is wide and is composed of sand, which is constantly shifting and changing the position of the stream. Many discharge measurements are necessary to procure reliable estimates of discharge.

The discharge for 1910 was determined by the indirect method for shifting channels and from rating tables covering short periods of time. The record may be considered fair.

Discharge measurements of San Diego River near Lakeside, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 12	W. V. Hardy	61	58	3.50	152
21	do	61	42	3.33	100
28	do	61	33	3.22	65
Feb. 12	do	51	21	3.14	38
18	do	52	23	3.17	36
24	do	43	23	3.18	44
28	do	38	21	3.15	36
Mar. 5	do	42	14	3.13	22
11	do	20	11	3.12	18
23	do	29	13	3.13	20
Apr. 1	do	61	33	3.37	68
3	do	61	29	3.28	54
16	do	56	20	3.20	30
25	do	6	2.4	3.07	2.7
27	do	4	1.2	3.02	1.1
May 6	do	5	2.0	3.06	2.6
17	do	3	.9	3.02	.82
19	do	1	.3	3.00	.33
June 2	do	1	.3	2.97	.31
6	do	1	.3	2.95	.23
Nov. 19	do				0

Daily gage height, in feet, of San Diego River near Lakeside, Cal., for 1910.

[J. H. Beadle, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	4.02	3.23	3.20	3.36	3.08	3.00	2.98	16	3.70	3.15	3.16	3.20	3.02	2.98	.....
2	4.15	3.30	3.18	3.33	3.08	3.00	2.98	17	3.95	3.12	3.10	3.18	3.01	2.97	.....
3	3.95	3.25	3.15	3.38	3.08	3.00	3.00	18	3.55	3.17	3.11	3.14	3.02	2.98	.....
4	3.78	3.20	3.12	3.30	3.07	2.95	3.00	19	3.45	3.20	3.11	3.16	3.03	2.96	.....
5	3.65	3.12	3.13	3.29	3.10	2.95	3.00	20	3.40	3.22	3.13	3.15	3.01	2.96	.....
6	3.52	3.20	3.12	3.27	3.06	2.95	3.00	21	3.35	3.45	3.11	3.12	3.02	2.96	.....
7	3.48	3.18	3.18	3.30	3.07	2.97	2.96	22	3.30	3.22	3.14	3.11	3.02	2.98	.....
8	3.48	3.20	3.18	3.27	3.06	3.00	2.95	23	3.25	3.19	3.15	3.11	3.01	2.98	.....
9	3.40	3.20	3.19	3.20	3.05	3.00	.....	24	3.22	3.18	3.14	3.08	3.02	2.98	.....
10	3.50	3.20	3.15	3.18	3.04	2.98	.....	25	3.21	3.19	3.13	3.07	3.03	2.98	.....
11	3.45	3.15	3.12	3.20	3.04	2.95	.....	26	3.28	3.20	3.25	3.09	3.03	2.98	.....
12	3.50	3.15	3.17	3.29	3.03	2.90	.....	27	3.25	3.15	3.30	3.05	3.03	3.00	.....
13	3.40	3.11	3.11	3.40	3.03	2.90	.....	28	3.22	3.17	3.55	3.03	3.03	2.98	.....
14	3.35	3.11	3.08	3.30	3.03	2.98	.....	29	3.23	.....	3.75	3.02	3.02	2.98	.....
15	3.35	3.11	3.09	3.25	3.00	2.97	.....	30	3.20	.....	3.70	3.03	3.01	3.00	.....
								31	3.18	.....	3.50	.....	3.01	.....	.....

NOTE.—No water running July 9 to Dec. 31.

Daily discharge, in second-feet, of San Diego River near Lakeside, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1....	391	65	46	69	3.6	0.6	0.4	16....	238	35	25	30	1.0	0.4	.....
2....	462	86	38	62	3.6	.6	.4	17....	355	27	15	26	.8	.3	.....
3....	355	70	30	74	3.6	.6	.6	18....	176	36	17	18	1.0	.4	.....
4....	273	56	22	54	3.0	.2	.6	19....	138	44	17	22	1.2	.3	.....
5....	217	36	22	52	5.0	.2	.6	20....	120	50	20	20	.8	.3	.....
6....	164	56	20	47	2.4	.2	.6	21....	102	124	17	14	1.0	.3	.....
7....	149	50	30	54	3.0	.3	.3	22....	86	52	22	11	1.0	.4	.....
8....	149	56	32	47	2.4	.6	.2	23....	71	46	23	11	.8	.4	.....
9....	120	56	32	32	2.0	.6	.....	24....	62	44	22	5.0	1.0	.4	.....
10....	156	56	24	29	1.6	.4	.....	25....	59	46	20	2.7	1.2	.4	.....
11....	138	43	18	32	1.6	.2	.....	26....	80	49	43	4.3	1.2	.4	.....
12....	156	41	27	52	1.2	.1	.....	27....	70	37	54	2.0	1.2	.6	.....
13....	120	30	17	80	1.2	.1	.....	28....	62	39	125	1.2	1.2	.4	.....
14....	102	29	12	54	1.2	.4	.....	29....	65	.....	194	1.0	1.0	.4	.....
15....	102	27	14	43	.6	.3	.....	30....	56	.....	176	1.2	.8	.6	.....
								31....	50	.....	109	.....	.8	.....	.....

NOTE.—No flow after July 8. Daily discharge determined from rating curves applicable as follows: Jan. 1 to Feb. 12, fairly well defined between 30 and 180 second-feet; Feb. 13 to Mar. 11, indirect method for shifting channels; Mar. 12 to Apr. 16, fairly well defined between 16 and 80 second-feet; Apr. 17 to 24, indirect method for shifting channels; Apr. 25 to July 8, fairly well defined.

Monthly discharge of San Diego River near Lakeside, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	462	50	156	9,590	B.
February	124	27	49.5	2,750	B.
March	194	12	41.4	2,550	B.
April	80	1.0	31.7	1,890	B.
May	5.0	.6	1.68	103	B.
June	.6	.1	.38	23	C.
July	.6	.0	.12	7	C.
The period	.....	.....	.....	16,900	

NOTE.—No flow from July 9 to Dec. 31.

Discharge measurements of San Diego flume near Lakeside, Cal., in 1909–1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	W. V. Hardy	5.9	3.1	0.52	6.3
Mar. 23	.....do	5.9	3.0	.51	6.2
25	.....do	5.9	4.4	.74	12.4
Apr. 6	.....do	5.9	2.5	.42	4.5
19	Clapp and Hardy	5.9	4.5	.74	11.5
May 25	W. V. Hardy	5.9	4.7	.80	11.6
1910.					
Jan. 22	W. V. Hardy	5.9	2.2	0.35	3.3
Feb. 12	.....do	5.9	3.2	.53	7.8
Mar. 4	.....do	5.9	3.4	.56	8.8
11	.....do	5.9	3.9	.63	9.8
Apr. 1	.....do	5.9	4.2	.68	11
3	.....do	5.9	3.1	.51	6.8
25	.....do	5.9	4.3	.72	12
27	.....do	5.9	4.5	.76	12
May 6	.....do	5.9	4.3	.72	11
23	.....do	5.9	3.4	.57	8.0
June 3	.....do	5.9	4.0	.66	9.5
26	.....do	5.9	3.8	.64	8.1
Nov. 18	.....do	5.9	1.8	.30	2.7

NOTE.—These measurements in 1909 were omitted from Water-Supply Paper 271.

Daily gage height, in feet, of San Diego flume near Lakeside, Cal., for 1910.

[San Diego Flume Co., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.53	0.00	0.00	0.54	0.76	0.60	0.61	0.52	0.60	0.62	0.48	0.40
2	.37	.00	.16	.44	.75	.62	.61	.57	.65	.62	.49	.39
3	.30	.00	.00	.45	.73	.65	.59	.60	.69	.67	.48	.43
4	.26	.00	.55	.29	.70	.66	.58	.60	.64	.70	.49	.51
5	.23	.14	.53	.26	.70	.65	.57	.56	.65	.61	.43	.57
6	.06	.40	.43	.25	.72	.64	.65	.59	.43	.56	.28	.52
7	.00	.00	.00	.34	.72	.64	.61	.58	.21	.57	.42	.47
8	.00	.00	.00	.52	.69	.60	.56	.56	.60	.61	.53	.35
9	.10	.04	.00	.58	.65	.58	.55	.57	.62	.67	.56	.50
10	.32	.00	.39	.40	.64	.51	.51	.59	.67	.66	.53	.47
11	.44	.16	.63	.29	.64	.50	.54	.57	.57	.74	.55	.45
12	.41	.35	.63	.29	.62	.49	.56	.58	.58	.64	.54	.42
13	.40	.57	.60	.33	.60	.58	.57	.61	.63	.65	.48	.44
14	.39	.34	.26	.45	.61	.62	.60	.57	.65	.65	.47	.43
15	.44	.32	.05	.60	.67	.61	.59	.58	.58	.59	.33	.43
16	.39	.24	.41	.68	.65	.60	.59	.60	.60	.31	.12	.44
17	.41	.14	.58	.67	.58	.59	.56	.61	.58	.00	.10	.46
18	.36	.00	.58	.67	.56	.57	.54	.61	.59	.16	.32	.46
19	.33	.00	.55	.75	.57	.57	.56	.62	.58	.46	.43	.48
20	.33	.00	.55	.82	.59	.56	.57	.59	.59	.46	.46	.57
21	.31	.21	.55	.80	.64	.57	.56	.57	.68	.56	.45	.48
22	.32	.41	.54	.76	.60	.59	.57	.59	.67	.60	.45	.29
23	.28	.35	.57	.75	.57	.59	.58	.58	.64	.44	.41	.25
24	.30	.24	.60	.72	.54	.59	.55	.59	.63	.40	.34	.38
25	.23	.00	.54	.74	.52	.61	.58	.52	.58	.53	.33	.45
26	.00	.47	.57	.76	.55	.60	.61	.53	.59	.55	.44	.48
27	.00	.46	.39	.76	.55	.59	.60	.53	.62	.52	.48	.42
28	.00	.15	.11	.77	.56	.59	.54	.46	.61	.48	.42	.40
29	.53	.....	.27	.76	.56	.58	.51	.46	.58	.50	.42	.42
30	.28	.....	.00	.56	.59	.57	.49	.54	.58	.47	.41	.43
31	.00	.....	.19	.....	64	.....	.51	.59	.....	.49	.....	.34

NOTE.—Gage readings represent the depth of water in the flume.

Daily discharge, in second-feet, of San Diego flume near Lakeside, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	0.0	0.0	7.1	12.5	8.5	8.7	6.7	8.5	9.0	5.8	4.2
2	3.7	.0	.9	5.0	12.3	9.0	8.7	7.8	9.7	9.0	6.0	4.0
3	2.5	.0	.0	5.2	11.7	9.7	8.3	8.5	10.7	10.2	5.8	4.3
4	2.0	.0	7.4	2.4	10.9	9.9	8.0	8.5	9.5	10.9	6.0	6.4
5	1.6	.7	6.9	2.0	10.9	9.7	7.8	7.6	9.7	8.7	4.8	7.3
6	.2	4.2	4.8	1.8	11.4	9.5	9.7	8.3	4.8	7.6	2.2	6.7
7	.0	.0	.0	3.2	11.4	9.5	8.7	8.0	1.3	7.8	4.6	5.6
8	.0	.0	.0	6.7	10.7	8.5	7.6	7.6	8.5	8.7	6.9	3.3
9	.4	.2	.0	8.0	9.7	8.0	7.4	7.8	9.0	10.2	7.6	6.2
10	2.8	.0	4.0	4.2	9.5	6.4	6.4	8.3	10.2	9.9	6.9	5.6
11	5.0	.9	9.2	2.4	9.5	6.2	7.1	7.8	7.8	12.0	7.4	5.2
12	4.4	3.3	9.2	2.4	9.0	6.0	7.6	8.0	8.0	9.5	7.1	4.6
13	4.2	7.8	8.5	3.0	8.5	8.0	7.8	8.7	9.2	9.7	5.8	5.0
14	4.0	3.2	2.0	5.2	8.7	9.0	8.5	7.8	9.7	9.7	5.6	4.8
15	5.0	2.8	.2	8.5	10.2	8.7	8.3	8.0	8.0	8.3	3.0	4.8
16	4.0	1.7	4.4	10.4	9.7	8.5	8.3	8.5	8.5	2.7	.6	5.0
17	4.4	.7	8.0	10.2	8.0	8.3	7.6	8.7	8.0	.0	.4	5.4
18	3.5	.0	8.0	10.2	7.6	7.8	7.1	8.7	8.3	.9	2.8	5.4
19	3.0	.0	7.4	12.3	7.8	7.8	7.6	9.0	8.0	5.4	4.8	5.8
20	3.0	.0	7.4	14.2	8.3	7.6	7.8	8.3	8.3	5.4	5.4	7.8
21	2.7	1.3	7.4	13.6	9.5	7.8	7.6	7.8	10.4	7.6	5.2	5.8
22	2.8	4.4	7.1	12.5	8.5	8.3	7.8	8.3	10.2	8.5	5.2	2.3
23	2.2	3.3	7.8	12.3	7.8	8.3	8.0	8.0	9.5	5.0	4.4	1.8
24	2.5	1.7	8.5	11.4	7.1	8.3	7.4	8.3	9.2	4.2	3.2	3.9
25	1.6	.0	7.1	12.0	6.7	8.7	8.0	6.7	8.0	6.9	3.0	5.2
26	.0	5.6	7.8	12.5	7.4	8.5	8.7	6.9	8.3	7.4	5.0	5.8
27	.0	5.4	4.0	12.5	7.4	8.3	8.5	6.9	9.0	6.7	5.8	4.6
28	.0	.8	.5	12.8	7.6	8.3	7.1	5.4	8.7	5.8	4.6	4.2
29	6.9	.....	2.1	12.5	7.6	8.0	6.4	5.4	8.0	6.2	4.6	4.6
30	2.2	.....	.0	7.6	8.3	7.8	6.0	7.1	8.0	5.6	4.4	4.8
31	.0	.....	1.1	.....	9.5	.....	6.4	8.3	.....	6.0	.....	3.2

NOTE.—Daily discharge determined from a fairly well-defined discharge rating curve.

Monthly discharge of San Diego flume near Lakeside, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
'	6.9	0.0	2.63	162	B.
y	7.8	.0	1.71	95	C.
	9.2	.0	4.57	281	C.
	14.2	1.8	8.14	484	B.
	12.5	6.7	9.22	567	B.
	9.9	6.0	8.30	494	B.
	9.7	6.0	7.77	478	B.
	9.0	5.4	7.80	480	B.
ber	10.7	1.3	8.50	506	B.
	12.0	.0	7.27	447	B.
ber	7.6	.4	4.83	287	B.
er	7.8	1.8	4.99	307	B.
he year	14.2	.0	6.34	4,590	

discharge, in second-feet, of San Diego River and flume near Lakeside, Cal., for 1910.

ay.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	398	65	46	76	16	9	9	6.7	8.5	9.0	5.8	4.2
	466	86	39	67	16	10	9	7.8	9.7	9.0	6.0	4.0
	358	70	30	79	15	10	9	8.5	10.7	10.2	5.8	4.8
	275	56	29	56	14	10	9	8.5	9.5	10.9	6.0	6.4
	219	37	29	54	16	10	8	7.6	9.7	8.7	4.8	7.8
	164	60	25	49	14	10	10	8.3	4.8	7.6	2.2	6.7
	149	50	30	57	14	10	9	8.0	1.3	7.8	4.6	5.6
	149	56	32	54	13	9	8	7.6	8.5	8.7	6.9	3.3
	120	56	32	40	12	9	7.4	7.8	9.0	10.2	7.6	6.2
	159	56	28	33	11	7	6.4	8.3	10.2	9.9	6.9	5.6
	143	44	27	34	11	6	7.1	7.8	7.8	12.0	7.4	5.2
	160	44	36	54	10	6	7.6	8.0	8.0	9.5	7.1	4.6
	124	38	25	83	10	8	7.8	8.7	9.2	9.7	5.8	5.0
	106	32	14	59	10	9	8.5	7.8	9.7	9.7	5.6	4.8
	107	30	14	52	11	9	8.3	8.0	8.0	8.3	3.0	4.8
	242	37	29	40	11	9	8.3	8.5	8.5	2.7	.6	5.0
	359	28	23	36	9	9	7.6	8.7	8.0	.0	.4	5.4
	180	36	25	28	9	8	7.1	8.7	8.3	.9	2.8	5.4
	141	44	24	34	9	8	7.6	9.0	8.0	5.4	4.8	5.8
	123	50	27	34	9	8	7.8	8.3	8.3	5.4	5.4	7.8
	105	125	24	28	10	8	7.6	7.8	10.4	7.6	5.2	5.8
	89	56	29	24	10	9	7.8	8.3	10.2	8.5	5.2	2.3
	73	49	31	23	9	9	8.0	8.0	9.5	5.0	4.4	1.8
	64	46	30	16	8	9	7.4	5.3	9.2	4.2	3.2	3.9
	61	46	27	15	8	9	8.0	6.7	8.0	6.9	3.0	5.2
	80	55	51	17	9	9	8.7	6.9	8.3	7.4	5.0	5.8
	70	42	58	14	9	9	8.5	6.9	9.0	6.7	5.8	4.6
	62	40	126	14	9	9	7.1	5.4	8.7	5.8	4.6	4.2
	72	.....	196	14	9	8	6.4	5.4	8.0	6.2	4.6	4.6
	58	.....	176	9	9	8	6.0	7.1	8.0	5.6	4.4	4.8
	50	.....	110	.....	10	.....	6.4	8.3	.....	6.0	.....	3.2

Monthly discharge of San Diego River and flume near Lakeside, Cal., for 1910.

[Drainage area, 208 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	466	50	159	0.764	0.88	[illegible]
February	125	28	51.2	.246	.26	[illegible]
March	196	14	46.0	.221	.25	[illegible]
April	83	9	39.8	.191	.21	[illegible]
May	16	8	10.9	.052	.06	[illegible]
June	10	6	8.68	.042	.05	[illegible]
July	10	6	7.89	.038	.04	[illegible]
August	9	5.4	7.80	.038	.04	[illegible]
September	10.7	1.3	8.50	.041	.05	[illegible]
October	12	.0	7.27	.035	.04	[illegible]
November	7.6	.4	4.83	.023	.03	[illegible]
December	7.8	1.8	4.99	.024	.03	[illegible]
The year	466	.0	29.7	.143	1.94	[illegible]

NOTE.—No flow in the river from July 9 to Dec. 31.

SAN DIEGUITO RIVER BASIN.[1]

SANTA YSABEL CREEK NEAR ESCONDIDO, CAL.

San Dieguito River, or Santa Ysabel Creek, as it is known from its source to the San Pasqual Valley, rises in the Volcan Mountains on the western slope of the Coast Range and flows westward through San Pasqual Valley, below which it takes its true name, and empties into the Pacific Ocean midway between Oceanside and San Diego. Its length is 50 miles, and the maximum width of the drainage basin about 15 miles. The total drainage area is approximately 340 square miles. It lies south of San Luis River and north of the San Diego River basin.

Numerous small tributaries enter San Ysabel Creek between its source and San Pasqual Valley, the most important being Black Canyon and Temescal creeks from the north and Santa Maria Creek from the south. Above San Pasqual Valley the creek maintains a light flow throughout the year, but below that point the channel is dry during the summer months.

The gaging station, which is located below the mouth of the narrow canyon at the upper end of the San Pasqual Valley, in the SW. ¼ sec. 31, T. 12 S., R. 1 E., 10 miles southeast of Escondido, was established Dec. 17, 1905.

Roden Canyon Creek and Temescal Creek, tributaries from the north, enter the Santa Ysabel Creek 1½ and 5 miles, respectively, above the gaging station. Santa Maria Creek enters from the south 4 miles below the gaging station.

[1] Called Bernardo River in previous reports.

No water is diverted from this stream above the gaging station. Within half a mile below the station, in the San Pasqual Valley, are two small irrigation canals. A third canal, with a capacity of about 45 second-feet, heads about 1 mile below the station, and about 2 miles below is a fourth, with a capacity of about 25 second-feet.

The gage is an inclined staff on the left bank. The datum of the gage has not been changed since the station was established.

At high stages discharge measurements are made from a cable at the gage.

The conditions for obtaining accurate discharge data at this station are extremely poor. The channel is composed of shifting sand which scours out at high stages of the stream and immediately fills in again as the flow decreases. Frequent measurements of discharge are necessary to procure reliable estimates.

The discharge for 1910 was estimated by the indirect method for shifting channels and from rating curves covering short periods of time. The record is approximate.

Discharge measurements of Santa Ysabel Creek near Escondido, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 11	W. V. Hardy	74	40	0.60	105
31	do	55	33	.51	66
Feb. 11	do	40	21	.57	44
19	do	30	16	.60	46
22	do	45	24	.67	53
23	do	45	27	.69	56
Mar. 6	do	20	14	.72	31
10	do	30	16	.76	34
22	do	35	18	.80	39
31	do	60	30	.96	57
Apr. 4	do	65	26	.94	42
8	do	55	24	.90	42
15	do	51	21	.90	34
28	do	18	10	.86	18
May 5	do	25	12	.87	20
16	do	15	6	.84	10
30	do	6	2.6	.75	4.2
June 2	do	12	4.2	.79	5.7
8	do	10	3.0	.77	3.3
30	do	5	1.2	.74	1.3
Nov. 25	do	8	2.4	.80	2.9

NOTE.—Measurements made by wading in the vicinity of the gage.

Daily gage height, in feet, of Santa Ysabel Creek near Escondido, Cal., for 1910.

[S. F. Potts, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	[a]2.40	0.52	0.73	0.94	0.88	0.78	0.70	16	0.90	0.60	0.75	0.98	0.82	0.78	.....
2	1.60	.52	.72	.94	.87	.79	.66	17	.70	.58	.77	.98	.82	.76	.....
3	1.42	.53	.72	.94	.86	.79	.64	18	.60	.60	.77	.98	.81	.76	.....
4	1.20	.53	.71	.94	.85	.79	.63	19	.58	.70	.77	.97	.80	.77	.....
5	.95	.53	.71	.93	.86	.79	.62	20	.55	.80	.78	.95	.80	.75	.....
6	.70	.52	.72	.93	.85	.79	.64	21	.53	.75	.78	.92	80	.73	.....
7	.68	.51	.72	.92	.84	.79	.63	22	.52	.73	.79	.90	82	.74	.....
8	.68	.52	.71	.92	.83	.79	.62	23	.52	.72	.80	.84	.81	.74	.....
9	.66	.52	.72	.92	.82	.77	.....	24	.52	.73	.80	.86	.81	.73	.....
10	.64	.52	.72	.91	.82	.76	.....	25	.52	.72	.80	.87	.81	.71	.....
11	.60	.57	.73	.92	.83	.74	.....	26	.52	.72	.81	.88	.80	.70	.....
12	.60	.53	.73	1.03	.83	.75	.....	27	.52	.75	.90	.89	.79	.68	.....
13	.60	.54	.74	1.02	.82	.76	.....	28	.52	.74	1.30	.86	.76	.67	.....
14	.57	.55	.73	1.01	.82	.77	.....	29	.52	.....	1.09	.87	.77	.66	.....
15	.60	.56	.74	1.00	.82	.77	.....	30	.52	.....	.94	.89	.77	.70	.....
								31	.52	.....	.97	.....	.....	.....	.....

[a] Maximum 2.7 feet; corresponding discharge, 3,950 second-feet.

NOTE.—Creek dry from July 9 to Dec. 31.

Daily discharge, in second-feet, of Santa Ysabel Creek near Escondido, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	3,100	64	45	50	19	5	1	16	340	45	37	49	10	2	.....
2	1,320	62	41	47	19	6	1	17	170	46	37	48	10	2	.....
3	1,020	60	39	44	20	5	.5	18	105	46	37	47	9	2	.....
4	690	58	35	42	20	5	.5	19	100	46	38	45	8	2	.....
5	390	56	33	42	20	4	.5	20	80	48	38	40	7	2	.....
6	170	54	31	42	19	4	.5	21	70	50	38	33	7	2	.....
7	155	52	31	42	18	3	.5	22	65	53	39	29	7	2	.....
8	155	50	32	42	17	3	.5	23	65	56	40	19	6	1	.....
9	140	48	33	45	16	3	.....	24	65	58	40	21	6	1	.....
10	125	46	34	42	15	3	.....	25	65	54	40	22	6	1	.....
11	105	44	35	42	14	3	.....	26	65	52	42	22	5	1	.....
12	105	44	35	62	13	3	.....	27	65	53	51	23	5	1	.....
13	105	44	36	60	12	3	.....	28	65	49	90	18	4	1	.....
14	90	45	36	62	11	3	.....	29	65	.....	70	18	4	1	.....
15	105	45	36	56	10	3	.....	30	65	.....	54	18	4	1	.....
								31	66	.....	57	.....	4	.....	.....

NOTE.—Creek dry from July 9 to Dec. 31. Daily discharge determined by the indirect method for shifting channels and from rating curves covering short periods of time. The values are, however, only approximate.

Monthly discharge of Santa Ysabel Creek near Escondido, Cal., for 1910.

[Drainage area, 128 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	3,100	65	300	2.34	.270	18,400
February	64	44	51.0	.398	.41	2,830
March	90	31	41.3	.323	.37	2,540
April	62	18	39.1	.305	.34	2,330
May	20	4	11.4	.089	.10	701
June	6	1	2.6	.020	.02	155
July	1	0	.16	.001	.001	10
The Period						27,000

NOTE.—No flow from July 9 to Dec. 31. On account of the unfavorable conditions at this station these estimates are only approximate.

SAN LUIS REY RIVER BASIN.

SAN LUIS REY RIVER NEAR PALA, CAL.

San Luis Rey River drains an area about 575 square miles in extent lying wholly in the northern part of San Diego County and extending from the crest of the Coast Range to the Pacific Ocean, a distance of 65 miles, with a maximum width of about 16 miles.

The river is formed by many small streams which have their sources in the higher elevations of the Coast Range and come together at the lower or west end of what is known as Warner's Valley. Below this point the river flows for a distance of 10 miles through a deep, narrow canyon with a heavy grade, then over a sandy and gravelly bed with light grade for some 40 miles, finally discharging into the Pacific Ocean at Oceanside.

This station, which is located at the road crossing to Sickler's mill, 4 miles above Pala, in the NW. ¼ sec. 31, T. 9 S., R. 1 W., was established October 9, 1903.

No tributaries enter the river near the gaging station. Water is diverted from the river during the winter and spring months at a point in the rough canyon about 11 miles above the station to a storage reservoir, and is used during the summer period for irrigation and municipal supply at Esconiddo and the surrounding country. About 3 miles below this point there is a diversion for irrigation on the Rincon Indian Reservation. One mile above the station a small amount is diverted for use on the Sickler ranch. The only diversion below the station is that used for irrigation on the Pala Indian Reservation. There are several pumping plants between Pala and the mouth, which obtain water from wells along the banks of the stream. The drainage area above the station is 318 square miles.

The staff gage is in two sections on the left bank at the cable from which discharge measurements are made. The datum of the gage was lowered 4.66 feet on November 13, 1906.

Conditions for obtaining accurate discharge data are poor. The channel is wide, is composed of sand, gravel, and bowlders, and is subject to constant change. The current is swift at flood stages.

The estimates of discharge were prepared from rating curves covering short periods of time and by interpolation on the days when the gage was not read. The record may be considered good.

Discharge measurements of San Luis Rey River near Pala, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 8	W. V. Hardy	62	50	7.55	164
Feb. 3	do	54	32	6.93	102
20	do	53	40	7.10	141
21	do	53	32	6.85	109
21	do	48	31	6.78	103
Mar. 8	do	43	20	6.40	43
9	do	43	19	6.37	42
29	do	90	62	7.30	177
Apr. 11	do	43	23	6.54	60
12	do	45	29	6.74	83
12	do	45	34	6.80	95
13	do	45	28	6.70	76
13	do	45	26	6.60	64
May 3	do	24	11	6.04	18
4	do	24	11	6.07	20
11	do	12	6	5.81	11
31	do	13	5.1	5.72	8.4
June 28	do	10	3.8	5.67	5.7
Sept. 20	C. C. Jacob	5.1	2.5	5.62	3.9
Nov. 23	W. V. Hardy	12	4.6	5.72	6.9

NOTE.—All measurements except Jan. 8 made by wading in the vicinity of the gage.

Daily gage height, in feet, of San Luis Rey River near Pala, Cal., for 1910.

[L. S. Salmons, observer.]

	Jan.	Feb.	Mar.	Apr.	May.	June.		Jan.	Feb.	Mar.	Apr.	May.	June.
1	[a]11.49	7.10	6.70	6.72	6.08	5.71	16	8.80	.....	6.34	6.48	5.80	5.66
2	9.48	7.00	6.70	6.70	6.07	5.70	17	8.60	.....	6.40	6.45	5.79	5.66
3	8.40	6.93	6.55	6.70	6.05	5.70	18	8.56	.....	6.60	6.40	5.79	5.66
4	7.60	6.92	6.62	6.70	5.98	5.70	19	8.40	.....	6.48	6.34	5.78	5.66
5	7.58	6.90	6.55	6.70	5.90	5.68	20	8.35	6.67	6.35	6.35	5.77	5.66
6	7.55	6.82	6.60	6.68	5.94	5.69	21	8.26	6.68	6.30	6.26	5.77	5.67
7	7.56	.....	.....	6.62	5.90	5.74	22	8.15	.....	6.42	6.21	5.76	5.67
8	7.55	.....	.....	6.60	5.86	5.67	23	8.00	.....	.....	6.17	5.76	5.67
9	7.55	.....	.....	6.58	5.85	5.66	24	7.96	6.60	.....	6.19	5.75	5.67
10	7.55	.....	.....	6.55	5.80	5.65	25	7.84	6.68	.....	6.12	5.75	5.67
11	7.68	.....	.....	6.54	5.81	5.64	26	7.72	.....	6.60	6.13	5.74	5.67
12	7.60	.....	.....	6.77	5.81	5.66	27	7.60	6.65	6.78	6.12	5.74	5.67
13	7.55	.....	6.32	6.65	5.80	5.66	28	7.58	6.70	7.73	6.11	5.73	5.67
14	7.50	6.37	6.41	6.54	5.80	5.66	29	7.40	.....	7.38	6.11	5.73	5.67
15	7.58	.....	.....	6.51	5.80	5.66	30	7.32	.....	7.12	6.10	5.72	5.67
							31	7.22	.....	6.85	.....	5.72	.....

[a] Maximum, 12.4 feet; corresponding discharge, 5,400 second-feet.

Daily discharge, in second-feet, of San Luis Rey River near Pala, Cal., for 1910.

	Jan.	Feb.	Mar.	Apr.	May.	June.		Jan.	Feb.	Mar.	Apr.	May.	June
1	3,770	100	79	82	20	63	16	695	52	39	52	9	5.2
2	1,200	85	79	79	20	6	17	580	58	44	49	8.7	5.2
3	485	78	60	79	18	6	18	560	63	66	44	8.7	5.2
4	205	77	69	79	15	6	19	485	69	52	39	8.4	5.2
5	200	75	60	79	12	5.6	20	462	75	40	40	8.1	5.2
6	192	71	66	76	14	5.8	21	422	76	35	32	8.1	5.4
7	195	67	62	69	12	7.2	22	375	73	46	28	7.8	5.4
8	192	63	58	66	11	5.4	23	320	69	51	25	7.8	5.4
9	192	60	54	64	10	5.2	24	308	66	56	26	7.5	5.4
10	192	56	50	60	9	5.0	25	272	76	61	22	7.5	5.4
11	225	52	45	59	9.3	4.8	26	236	74	66	23	7.2	5.4
12	205	49	41	89	9.3	5.2	27	205	72	90	22	7.2	5.4
13	192	45	37	72	9	5.2	28	200	79	259	22	6.9	5.4
14	180	41	45	59	9	5.2	29	155	.....	191	22	6.9	5.4
15	200	47	42	55	9	5.2	30	139	.....	145	21	6.6	5.4
							31	119	.....	101	.....	6.6	.....

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 1 to Feb. 6, fairly well defined; Feb. 14 to June 30, well defined, below 200 second-feet. Discharge interpolated for days on which gage was not read.

Monthly discharge of San Luis Rey River near Pala, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3,770	119	431	26,500	C.
February	100	41	66.7	3,700	B.
March	259	35	70.6	4,340	B.
April	89	21	51.1	3,040	B.
May	20	6.6	9.99	614	B.
June	7.2	4.8	5.47	325	B.
The period	.....	.....	.....	38,500	

SANTA ANA RIVER BASIN.

SANTA ANA RIVER AND MENTONE POWER CO.'S CANAL NEAR MENTONE, CAL.

Of the three important streams—Santa Ana, San Gabriel, and Los Angeles rivers—that traverse the valley of southern California, the Santa Ana is the most important. Its drainage basin, lying south of the San Bernardino Mountains and the Sierra Madre and taking waters from their southern slopes, is the most eastern and comprises by far the largest area, including the northern part of Orange County, the northwestern part of Riverside County, and the southwestern part of San Bernardino County. Of the total drainage area, covering between 1,800 and 1,900 square miles, about two-thirds are in the valley, but only a few hundred yield much run-off.

The Santa Ana rises in the heart of the San Bernardino Mountains, about 30 miles east of Highland, and flows westward for about 25 miles to the mouth of its upper canyon; thence southwestward across San Bernardino Valley, through the lower canyon in the

Santa Ana Mountains, and across the Coastal Plain to the Pacific Ocean at Newport Beach. Although the course of the stream measures about 100 miles, there is continuous surface flow from mountain to sea only during winter floods.

Many small streams from the southern slope of the San Bernardino Mountains and a few from the Sierra Madre west of the Cajon Pass flow toward the Santa Ana, but some of these discharge water to the main stream only in the flood seasons, the ordinary flow either being diverted or sinking into the sand and gravel of San Bernardino Valley. The principal tributaries are Bear, Alder, Mill, Lytle, and Chino creeks.

This station, which is located at the road crossing opposite Warm Spring Canyon, about three-fourths of a mile below the headworks of the Mentone Power Co.'s canal, 5 miles northeast of Mentone, in the SW. ¼ sec. 34, T. 1 N., R. 2 W., S. B. M., was established in June, 1896, and is about 2 miles below the mouth of Alder Creek.

Practically all the low-water flow is diverted above the station into the power canal. After leaving the power house this water is carried across the river to an irrigation canal. The flow in the canal is measured by a weir and is added to that at the station in order to obtain the total for the stream. The acquired water rights exceed the low-water flow.

The original staff gage was fastened to the left bank about 100 feet above the ford. The gage datum was lowered June 30, 1903. January 1, 1910, a severe flood carried away both gage and the car and cable from which discharge measurements were made and destroyed existing bench marks. The channel was completely changed. A new inclined staff gage was installed January 23, 1910, on the left bank, 50 feet above the former location, and set at a new datum. On February 25, 1910, however, it was found desirable to install a gage in the right channel, which carried most of the water. All gage heights prior to February 25 have been corrected to the datum of the west gage from a relation curve obtained from synchronous readings of the two gages.

Discharge measurements are made by wading at low and medium stages. As it is very difficult to reach the station at high stages the cable has not been replaced.

Conditions for obtaining accurate discharge data are fair. The stream has a rocky bed and is subject to slight change. At high stages the current is swift and it is difficult to get accurate gagings. The records are fairly satisfactory.

Discharge measurements of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., in 1910.

Date.	Hydrographer.	Gage height,	Discharge.		
			River.	Canal.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Feb. 5	R. E. Haines	1.52	31	73	104
24	J. E. Stewart	1.40	19	66	85
Apr. 13	do	1.95	67	78	145
28	W. B. Clapp	1.30	11	78	89
June 7	do	1.21	6.9	72	79
July 20	J. E. Stewart	1.92	67	0	67
Sept. 14	W. B. Clapp	1.28	6.4	58	64

Daily gage height, in feet, of Santa Ana River near Mentone, Cal., for 1910.

[S. H. Rhodes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	1.65	1.5	1.75	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
2	.....	1.65	1.5	2.0	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
3	.....	1.65	1.5	1.7	1.3	1.1	1.1	1.1	1.4	1.2	1.1	1.1
4	.....	1.75	1.5	1.5	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
5	.....	1.5	1.5	1.5	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
6	.....	1.75	1.5	1.4	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
7	.....	1.65	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
8	.....	1.65	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
9	.....	1.9	1.5	1.3	1.3	1.1	1.1	1.1	1.2	1.2	1.1	1.1
10	.....	2.25	1.5	1.3	1.3	1.1	1.1	1.1	1.3	1.2	1.1	1.1
11	.....	2.25	1.5	1.8	1.3	1.1	1.1	1.1	1.3	1.2	1.1	1.1
12	.....	2.25	1.5	1.9	1.3	1.1	1.1	1.1	1.4	1.4	1.1	1.1
13	.....	1.9	2.3	1.9	1.3	1.1	1.1	1.1	1.4	1.4	1.1	1.1
14	.....	1.9	2.3	1.9	1.3	1.2	1.1	1.1	1.3	1.4	1.1	1.1
15	.....	1.5	1.5	1.9	1.3	1.2	1.1	1.1	1.2	1.1	1.1	1.1
16	.....	1.5	1.5	1.9	1.3	1.2	2.1	1.1	1.4	1.1	1.1	1.1
17	.....	1.5	1.5	1.8	1.2	1.2	2.1	1.1	1.2	1.1	1.1	1.1
18	.....	1.5	1.5	1.8	1.3	1.2	2.0	1.1	1.2	1.1	1.1	1.1
19	.....	1.5	1.5	1.5	1.3	1.2	2.0	1.1	1.2	1.1	1.1	1.1
20	.....	1.5	1.5	1.4	1.3	1.2	1.9	1.1	1.2	1.1	1.1	1.1
21	.....	1.5	1.5	1.3	1.3	1.1	1.9	1.1	1.2	1.1	1.1	1.1
22	.....	1.5	1.5	1.3	1.3	1.1	1.9	1.1	1.2	1.1	1.1	1.1
23	2.25	1.5	1.5	1.2	1.3	1.1	1.5	1.1	1.2	1.1	1.1	1.1
24	1.9	1.5	1.5	1.2	1.3	1.1	1.4	1.1	1.2	1.1	1.1	1.1
25	2.6	1.5	1.7	1.3	1.3	1 1	1.3	1.1	1.2	1.1	1.1	1.1
26	2.4	1.5	1.7	1.2	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.1
27	2.25	1.5	1.5	1.2	1.1	1.1	1.2	1.1	1.2	1.1	1.1	1.1
28	2.25	1.5	1.5	1.2	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
29	2.25	.....	1.9	1.3	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
30	2.1	.....	1.75	1.3	1.1	1.1	1.1	1.1	1.2	1.1	1.1	1.1
31	2.1	.....	1.75	.....	1.1	.....	1.1	1	.....	1.1	.....	1.1

NOTE.—Old gage washed out Jan. 1, 1910, and a new gage installed on Jan. 23, 1910, at a new location and datum. See description.

Daily discharge, in second-feet, of Santa Ana River near Mentone, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	[a]8,500	38	26	48	11	2	2	2	15	4	2	2
2	.....	38	26	74	11	2	2	2	15	4	2	2
3	.....	38	26	43	11	2	2	2	15	4	2	2
4	.....	48	26	26	11	2	2	2	4	4	2	2
5	.....	26	26	26	11	2	2	2	4	4	2	2
6	.....	48	26	18	11	2	2	2	4	4	2	2
7	.....	38	26	11	11	2	2	2	4	4	2	2
8	.....	38	26	11	11	2	2	2	4	4	2	2
9	.....	63	26	11	11	2	2	2	4	4	2	2
10	.....	103	26	11	11	2	2	2	8	4	2	2
11	.....	103	26	53	11	2	2	2	8	4	2	2
12	.....	103	26	63	11	2	2	2	15	15	2	2
13	.....	63	109	63	11	2	2	2	15	15	2	2
14	.....	63	109	63	11	6	2	2	8	15	2	2
15	.....	26	26	63	11	6	2	2	4	2	2	2
16	.....	26	26	63	11	6	85	2	15	2	2	2
17	.....	26	26	53	6	6	85	2	4	2	2	2
18	.....	26	26	53	11	6	74	2	4	2	2	2
19	.....	26	26	26	11	6	74	2	4	2	2	2
20	.....	26	26	18	11	6	63	2	4	2	2	2
21	.....	26	26	11	11	2	63	2	4	2	2	2
22	.....	26	26	11	11	2	63	2	4	2	2	2
23	103	26	26	6	11	2	26	2	4	2	2	2
24	63	26	26	6	11	2	18	2	4	2	2	2
25	154	26	43	11	11	2	11	2	4	2	2	2
26	123	26	43	6	2	2	6	2	4	2	2	2
27	103	26	26	6	2	2	6	2	4	2	2	2
28	103	26	26	6	2	2	2	2	4	2	2	2
29	103	.....	63	11	2	2	2	2	4	2	2	2
30	85	.....	48	11	2	2	2	2	4	2	2	2
31	85	.....	48	.....	2	.....	2	33	.....	2	.....	2

[a] Computed from cross-section and slope data obtained after the high water.

NOTE.—Daily discharge determined from rating curves applicable as follows: Jan. 23 to Aug. 30, fairly well defined below 140 second-feet; Aug. 31 to Dec. 31, poorly defined.

No water in Mentone Power Co.'s canal Mar. 13 and 14 and July 16 to 22.

Monthly discharge of Santa Ana River near Mentone, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January (23–31)	154	63	102	1,820	B.
February	103	26	41.9	2,330	B.
March	109	26	35.1	2,160	B.
April	74	6	29.4	1,750	B.
May	11	2	9.1	560	B.
June	6	2	2.9	173	B.
July	85	2	19.7	1,210	B.
August	33	2	3.0	184	B.
September	15	4	6.6	393	C.
October	15	2	4.0	246	C.
November	2	2	2.0	119	C.
December	2	2	2.0	123	C.
The period	.....	.....	.....	11,100	

Daily discharge, in second-feet, of Mentone Power Co.'s canal near Mentone, Cal., for 1910.

[S. H. Rhodes, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	74	64	74	78	73	57	55	58	68	52	43
2	.....	72	66	66	78	72	58	57	58	59	46	42
3	.....	72	72	64	78	72	57	58	59	57	45	44
4	.....	73	74	72	78	72	56	51	54	58	48	42
5	.....	73	76	71	78	55	56	55	51	57	44	44
6	.....	68	72	72	79	74	63	56	55	51	45	43
7	.....	76	72	78	76	72	59	57	55	55	44	41
8	.....	73	72	79	66	72	59	59	60	58	42	41
9	39	76	72	78	78	71	59	59	56	57	43	41
10	45	76	68	79	76	72	56	62	60	58	41	42
11	57	74	68	79	76	68	55	58	58	62	42	43
12	52	63	68	74	76	63	62	55	60	58	41	41
13	58	68	.....	78	76	71	56	56	58	58	42	42
14	54	73	.....	78	76	71	64	59	58	56	48	41
15	58	68	73	79	73	73	66	55	60	58	52	41
16	49	68	77	78	76	73	.....	56	62	54	48	41
17	56	68	79	78	76	71	.....	58	60	54	45	41
18	62	68	78	77	77	66	.....	57	52	57	45	44
19	55	73	77	77	78	64	.....	68	52	51	44	44
20	55	64	78	77	77	65	.....	66	59	46	44	45
21	57	73	78	77	76	66	.....	68	59	59	43	43
22	57	72	79	77	76	60	.....	66	55	64	45	42
23	64	66	79	73	76	64	43	64	62	54	44	44
24	66	66	74	73	76	60	54	62	64	54	44	43
25	65	66	65	73	74	60	55	60	58	58	42	41
26	62	64	71	78	78	57	54	59	59	63	51	43
27	62	62	70	73	73	59	54	63	60	65	48	43
28	78	64	72	78	74	59	66	62	60	59	48	42
29	78	.....	68	79	74	59	68	63	60	59	43	42
30	79	.....	71	78	73	60	63	60	70	58	42	43
31	79	.....	70	.....	73	.....	63	62	.....	56	.....	41

NOTE.—Daily discharge determined by means of a weir. No flow in the canal on days for which no discharge is given.

Monthly discharge of Mentone Power Co.'s canal near Mentone, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	79	0	44.7	2,750
February	76	62	69.7	3,870
March	79	0	67.8	4,170
April	79	64	75.6	4,500
May	79	66	75.8	4,660
June	73	55	66.5	3,960
July	68	0	45.3	2,790
August	68	51	59.5	3,660
September	70	51	58.4	3,480
October	68	46	57.5	3,540
November	52	41	45.0	2,680
December	45	41	42.4	2,610
The year	79	0	58.9	42,700

NOTE.—Monthly discharge computed from records kept on weir at intake.

Daily discharge, in second-feet, of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a8,500	112	90	122	89	75	59	57	73	72	54	45
2	.....	110	92	140	89	74	60	59	73	63	48	44
3	.....	110	98	107	89	74	59	60	74	61	47	46
4	.....	121	100	98	89	74	58	53	58	62	50	44
5	.....	99	102	97	89	57	58	57	55	61	46	46
6	.....	116	98	90	90	76	65	58	59	55	47	45
7	.....	114	98	89	87	74	61	59	59	59	46	43
8	.....	111	98	90	77	74	61	61	64	62	44	43
9	.....	139	98	89	89	73	61	61	60	61	45	43
10	.....	179	94	90	87	74	58	64	68	62	43	44
11	.....	177	94	132	87	70	57	60	66	66	44	45
12	.....	166	94	137	87	65	64	57	75	73	43	43
13	.....	131	109	141	87	73	58	58	73	73	44	44
14	.....	136	109	141	87	77	66	61	66	71	50	43
15	.....	94	99	142	84	79	68	57	64	60	54	43
16	.....	94	103	141	87	79	85	58	77	56	50	43
17	.....	94	105	131	79	77	85	60	64	56	47	43
18	.....	94	104	130	88	72	74	59	56	59	47	46
19	.....	99	103	103	89	70	74	70	56	53	46	46
20	.....	90	104	95	88	71	63	68	63	48	46	47
21	.....	99	104	88	87	68	63	70	63	61	45	45
22	.....	98	105	88	87	62	63	68	59	66	47	44
23	167	92	105	79	87	66	69	66	66	56	46	46
24	129	92	100	79	87	62	72	64	68	56	46	45
25	219	92	108	84	85	62	66	62	62	60	44	43
26	185	90	114	84	80	59	60	61	63	65	53	45
27	165	88	96	79	75	61	60	65	64	67	50	45
28	181	90	98	84	76	61	68	64	64	61	50	44
29	181	.....	131	90	76	61	70	65	64	61	45	44
30	164	.....	119	89	75	62	65	62	74	60	44	45
31	164	.....	118	.....	75	.....	65	95	.....	58	.....	43

a Estimated.

Monthly discharge of Santa Ana River and Mentone Power Co.'s canal near Mentone, Cal., for 1910.

[Drainage area, 182 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January (23–31)	219	129	173	0.951	0.32	3,090
February	179	88	112	.615	.64	6,220
March	131	90	103	.566	.65	6,330
April	142	79	105	.577	.64	6,250
May	90	75	84.9	.466	.54	5,220
June	79	57	69.4	.381	.43	4,130
July	85	57	65.0	.357	.41	4,000
August	95	53	62.5	.343	.40	3,840
September	77	55	65.0	.357	.40	3,870
October	73	48	61.4	.337	.39	3,780
November	54	43	47.0	.258	.29	2,800
December	47	43	44.4	.244	.28	2,730
The period	.....	.....	.....	.....	.....	52,300

SAN GABRIEL RIVER BASIN.

SAN GABRIEL RIVER AND POWER CANAL NEAR AZUSA, CAL.

San Gabriel River is one of the three most important streams traversing the valley of southern California. Its drainage basin lies wholly in Los Angeles County west of the Santa Ana basin and east of the Los Angeles basin, and stretches from the crest of the Sierra Madre to the Pacific, a distance of about 50 miles. Its total drainage area is approximately 700 square miles, about one-third of which consists of mountain slopes, which contribute practically all of the run-off except in heavy storms. The remaining two-thirds is embraced in the San Gabriel Valley at the base of the mountains and in the coastal plain southeast of the city of Los Angeles.

The main stream is formed by the junction of two principal forks, one from the north and east and the other from the west. Each of the branches receives many tributaries from the crests of the surrounding ranges. The headwaters come from the western slope of San Antonio Peak (Old Baldy), altitude 10,080 feet, and from the southern slope of other high peaks at the north, such as North Baldy and Islip mountains. The west fork drains the northern slope of Mount Wilson, the eastern and northern slopes of San Gabriel Peak, and a portion of the southern slopes of the main range to the north. It joins the main stream about 8 miles above the mouth of the canyon. The general course of the stream is southwestward. After leaving the mountains it traverses San Gabriel Valley in a wide wash of sand, gravel, and bowlders, then breaks through the range of foothills separating San Gabriel Valley from the coastal plain at a point called The Narrows, about 5 miles northwest of Whittier, and enters the coastal plain, across which it flows to its mouth in Alamitos Bay, a few miles east of Long Beach. The total length of the stream is about 65 or 70 miles.

The principal tributaries of San Gabriel River are Fish Fork and Cattle Creek from the east and Iron and West forks from the west.

The basin is rather poorly forested, having a sparse timber growth on the higher slopes and brush with some scattering timber on the middle and lower elevations.

This station, which is located just above the road crossing at the mouth of the canyon, about one-fourth mile above the Pacific Light & Power Co.'s power house and 2 miles north of Azusa, in the NW. ¼ sec. 23, T. 1 N., R. 10 W., S. B. M., was established in 1896. Estimates of flow were very unsatisfactory until after the completion of the power canal in 1898.

The station is well below all tributaries and is several miles below the power and irrigation diversions.

The gage is an inclined staff in several sections, on the left bank.

Discharge measurements are made from a cable at the gage.

The flow in the canal is measured by a weir and is added to that at the station to obtain the total flow of the stream. Various temporary diversions for irrigation just above the station affect the discharge. The acquired water rights greatly exceed the low-water flow of the stream.

The channel is composed of gravel and bowlders and is subject to considerable change, especially above and below the measuring section. The current is swift, and measurements at flood stages are difficult.

The rating curve for 1910 is fairly well defined for low and medium stages. The record for high stages is approximate.

Discharge measurements of San Gabriel River and power canal near Azusa, Cal., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.		
			River.	Canal.	Total.
		Feet.	*Sec.-ft.*	*Sec.-ft.*	*Sec.-ft.*
Jan. 3	J. E. Stewart	5.10	1,870	57	1,930
29	R. E. Haines	3.60	267	69	336
Feb. 28	Clapp and Stewart	3.15	80	73	153
Mar. 30	W. B. Clapp	3.30	108	73	181
Apr. 12	J. E. Stewart	3.10	84	72	156
29	W. B. Clapp	2.80	40	72	112
May 5	.....do	2.63	23	72	95
13	.....do	2.24	6	72	78
June 3	.....do	1.85	0	68	68

NOTE.—Additional diversions were being made at a tunnel about 800 feet above the gage as follows:
April 29, 3 second-feet (estimated).
May 5, 14.5 second-feet.
May 13, 15.9 second-feet.
June 3, 0 second-feet.
These diversions are not included in any of the values in the above table.

Daily gage height, in feet, of San Gabriel River near Azusa, Cal., for 1910.

[H. E. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	[a]9.8	3.6	3.1	3.2	2.7	1.85	16	4.0	3.3	3.0	3.0	2.2	.....
2	5.9	3.5	3.1	3.2	2.7	.....	17	3.9	3.3	3.0	3.0	2.2	.....
3	5.1	3.5	3.1	3.2	3.7	.....	18	3.9	3.3	3.1	3.0	2.2	.....
4	4.8	3.5	3.1	3.2	2.7	.....	19	3.9	3.3	3.0	3.0	2.2	.....
5	4.5	3.5	3.1	3.1	2.7	.....	20	3.9	3.3	3.0	3.0	2.2	.....
6	4.5	3.4	3.1	3.1	2.6	.....	21	3.9	3.2	3.0	2.9	2.2	.....
7	4.5	3.4	3.1	3.1	2.6	.....	22	3.8	3.2	3.45	2.9	2.2	.....
8	4.2	3.4	3.1	3.1	2.6	.....	25	3.8	3.2	3.2	2.9	2.1	.....
9	4.2	3.4	3.1	3.1	2.5	.....	24	3.8	3.2	3.2	2.9	2.1	.....
10	4.1	3.4	3.1	3.1	2.5	.....	25	3.7	3.2	3.1	2.9	2.1	.....
11	4.1	3.4	3.1	3.1	2.5	.....	26	3.7	3.2	3.1	2.9	2.1	.....
12	4.1	3.3	3.0	3.1	2.3	.....	27	3.7	3.1	3.1	2.9	2.1	.....
13	4.0	3.3	3.0	3.1	2.3	.....	28	3.7	3.1	3.3	2.9	2.1	.....
14	4.0	3.3	3.0	3.0	2.3	.....	29	3.6	.....	3.3	2.8	2.0	.....
15	4.0	3.3	3.0	3.0	2.3	.....	30	3.6	.....	3.3	2.7	2.0	.....
							31	3.5	.....	3.3	.....	1.9	.....

[a] Maximum, 10.3 feet; corresponding discharge, 13,900 second-feet.

NOTE.—Water was standing in pools June 2 to June 18. From June 19 to Dec. 31 the river bed was dry.

Daily discharge, in second-feet, of San Gabriel River near Azusa, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	12,400	253	78	96	30	.....	16	541	119	63	63	4.5	.....
2	3,090	200	78	96	30	.....	17	455	119	63	63	4.5	.....
3	1,850	200	78	96	30	.....	18	455	119	78	63	4.5	.....
4	1,440	200	78	96	30	.....	19	455	119	63	63	4.5	.....
5	1,070	200	78	78	30	.....	20	455	119	63	63	4.5	.....
6	1,070	153	78	78	22	.....	21	455	96	63	50	4.5	.....
7	1,070	153	78	78	22	.....	22	379	96	176	50	4.5	.....
8	733	153	78	78	22	.....	23	379	96	96	50	2.5	.....
9	733	153	78	78	16	.....	24	379	96	96	50	2.5	.....
10	634	153	78	78	16	.....	25	312	96	78	50	2.5	.....
11	634	153	78	78	16	.....	26	312	96	78	50	2.5	.....
12	634	119	63	78	7	.....	27	312	78	78	50	2.5	.....
13	541	119	63	78	7	.....	28	312	78	119	50	2.5	.....
14	541	119	63	63	7	.....	29	253	.....	119	39	1	.....
15	541	119	63	63	7	.....	30	253	.....	119	30	1	.....
							31	200	.....	119	.....	0.5	.....

NOTE.—Daily discharge January to May determined from a rating curve fairly well defined below 2,000 second-feet.

Monthly discharge of San Gabriel River near Azusa, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	12,400	200	1,060	65,200	C.
February	253	78	135	7,500	B.
March	176	63	83.3	5,120	B.
April	96	30	66.5	3,960	B.
May	30	.5	11.0	676	B.
The period	.....	.....	.....	82,500	

NOTE.—River dry June 1 to Dec. 31, 1910.

Daily discharge, in second-feet, of San Gabriel canal near Azusa, Cal., for 1910.

[H. E. Ward, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	53	69	73	73	72	67	49	33	24	23	26	33
2	49	72	73	73	72	68	50	32	24	22	26	32
3	57	74	73	74	72	68	49	31	24	23	29	31
4	68	74	73	73	72	68	48	31	24	23	31	32
5	71	74	73	73	72	68	47	31	25	24	29	32
6	70	74	73	73	72	67	45	30	25	23	28	32
7	71	74	73	73	73	67	45	29	24	22	29	32
8	71	73	73	73	72	66	43	29	24	23	29	32
9	72	73	73	73	72	63	42	29	24	23	29	31
10	72	73	73	73	72	63	42	29	23	23	28	32
11	72	74	73	72	72	61	40	29	23	25	27	32
12	72	73	73	72	72	60	41	29	23	26	27	33
13	73	74	73	72	72	61	40	29	23	26	39	32
14	72	65	73	72	72	62	40	29	24	26	36	32
15	72	66	73	72	72	66	39	29	24	32	36	32
16	73	71	73	72	72	66	39	28	24	32	35	32
17	72	73	73	72	72	64	37	28	24	31	34	32
18	72	73	73	72	72	58	38	26	23	30	34	33
19	65	73	73	72	71	56	38	25	22	27	34	34
20	22	73	73	72	71	54	36	26	23	26	32	36
21	70	74	73	72	70	54	37	26	23	26	32	35
22	73	73	73	72	70	55	37	26	21	26	32	33
23	75	73	73	72	70	56	36	26	21	25	32	33
24	70	73	73	71	70	54	35	26	21	24	31	35
25	68	73	73	72	70	52	36	25	22	24	31	35

Daily discharge, in second-feet, of San Gabriel canal near Azusa, Cal., for 1910—Contd.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
26	74	73	73	71	70	50	34	25	22	25	34	34
27	69	73	73	72	70	49	35	26	22	25	34	34
28	69	73	73	72	69	50	35	25	22	24	33	33
29	69	.....	73	72	69	50	35	25	22	24	33	33
30	69	.....	73	72	68	50	34	25	22	27	33	32
31	69	.....	73	.....	68	.....	35	25	.....	27	.....	33

NOTE.—Discharge determined by means of a weir.

Monthly discharge of San Gabriel canal near Azusa, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	75	22	67.5	4,150
February	74	65	72.5	4,030
March	73	73	73.0	4,490
April	74	71	72.3	4,300
May	73	68	71.1	4,370
June	68	49	59.8	3,560
July	50	34	39.9	2,450
August	33	25	27.8	1,710
September	25	21	23.1	1,370
October	32	22	25.4	1,560
November	39	26	31.4	1,870
December	36	31	32.8	•2,020
The year	75	21	49.6	35,900

NOTE.—Monthly discharge computed from record kept on the weir.

Daily discharge, in second-feet, of San Gabriel River and San Gabriel power canal near Azusa, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,500	322	151	169	102	67	49	33	24	23	26	33
2	3,140	272	151	169	102	68	50	32	24	22	26	32
3	1,900	274	151	170	102	68	49	31	24	23	29	31
4	1,510	274	151	169	102	68	48	31	24	23	31	33
5	1,140	274	151	151	102	68	47	31	25	24	29	33
6	1,140	227	151	151	94	67	45	30	25	23	28	33
7	1,140	227	151	151	95	67	45	29	24	22	29	33
8	804	226	151	150	94	66	43	29	24	23	29	33
9	805	226	151	151	88	63	42	29	24	23	29	31
10	706	226	151	151	88	63	42	29	23	23	28	32
11	706	227	151	150	88	61	40	29	23	25	27	33
12	706	192	136	150	79	60	41	29	23	26	27	33
13	614	193	136	150	79	61	40	29	23	26	39	33
14	613	184	136	135	79	62	40	29	24	26	36	33
15	613	185	136	135	79	66	39	29	24	32	36	33
16	614	190	136	135	76	66	39	28	24	32	35	33
17	527	192	136	135	76	64	37	28	24	31	34	33
18	527	192	151	135	76	58	38	26	23	30	34	33
19	520	192	136	135	76	56	38	25	22	27	34	34
20	477	192	136	135	76	54	36	26	23	26	32	36
21	525	170	136	122	75	54	37	26	23	26	32	35
22	452	169	249	122	74	55	37	26	21	26	32	33
23	454	169	169	122	73	56	36	26	21	25	32	33
24	449	169	169	121	73	54	35	26	21	24	31	35
25	380	169	151	122	72	52	36	25	22	24	31	35
26	386	169	151	121	72	50	34	25	22	25	34	34
27	381	151	151	122	72	49	35	26	22	25	34	34
28	381	151	192	122	71	50	35	25	22	24	33	33
29	322	.....	192	111	70	50	35	25	22	24	33	33
30	322	.....	192	102	69	50	34	25	22	27	33	33
31	269	.....	192	.....	68	.....	35	25	.....	27	.....	33

Monthly discharge of San Gabriel River and power canal near Azusa, Cal., for 1910.

[Drainage area, 222 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	12,500	269	1,130	5.09	5.87	69,500
February	322	151	207	.932	.97	11,500
March	249	136	156	.703	.81	9,590
April	170	102	139	.626	.70	8,270
May	102	68	82.1	.370	.43	5,050
June	68	49	59.8	.269	.30	3,560
July	50	34	39.9	.180	.21	2,450
August	33	25	27.8	.125	.14	1,710
September	25	21	23.1	.104	.12	1,370
October	32	22	25.4	.114	.13	1,560
November	39	26	31.4	.141	.16	1,870
December	36	31	32.8	.148	.17	2,020
The year	12,500	21	163	.734	10.01	118,000

NOTE.—This table does not include diversion made at tunnel about 800 feet above the gage. Hence the discharge per square mile and the run-off in inches are subject to considerable error during the irrigating season.

LOS ANGELES RIVER BASIN.

ARROYO SECO NEAR PASADENA, CAL.

Los Angeles River is formed by Tujunga, Pacoima, and other small creeks, whose sources lie in the Sierra Madre northeast of the city of Los Angeles. These streams leave the mountains at a point about 25 miles above the city and enter the comparatively flat country of the San Fernando Valley, where, except at times of excessive flood, the waters disappear in the sand and gravel washes. At the lower end of this valley is a secondary range of hills, extending from east to west, and bed-rock obstruction forces the waters to the surface to form what is known as Los Angeles River. Below this point the river flows through the flat country of the Los Angeles Valley and enters the Pacific near the town of Long Beach.

At the city of Los Angeles it is joined by Arroyo Seco, which drains an area comprising 21 square miles of the Sierra Madre. This stream issues from the mountains on the west side of Pasadena Mesa, and passes through an opening in a granite spur known as Devils Gate. Between the point where it leaves the mountain and Devils Gate lies a broad river bottom 2 miles long, composed of coarse material. In passing over this the water sinks rapidly, diminishing in volume of flood water from the mouth of the canyon to Devils Gate.

During the summer months the entire flow of Los Angeles River is diverted at a point about 5 miles above Los Angeles for the supply of the city, only a small amount of water passing this point except during flood periods.

The gaging station, which is located in the SE. ¼ sec. 30, T. 2 N., R. 12 W., S. B. M., at the ranger's camp in the Angeles National Forest, about 4 miles north of Pasadena, was established December 1, 1910.

The staff gage is in two sections, fastened to an alder tree on the right bank, 300 feet southeast of the ranger's cabin. Discharge measurements are made by wading near the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimate has been prepared for 1910.

The following discharge measurement was made by W. V. Hardy, by wading about 50 feet below gage:

December 1, 1910: Width, 3.5 feet; area 1.4 square feet; gage height, 3.44 feet; discharge, 1.4 second-feet.

Daily gage height, in feet, of Arroyo Seco near Pasadena, Cal., for 1910.

[G. J. Dunston, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1		9	3.48	16	3.55	24	3.60
2		10	3.47	17	3.55	25	3.62
3				18	3.56		
4		11	3.48	19	3.56	26	3.62
5	3.47	12	3.47	20	3.57	27	3.63
		13	3.49			28	3.63
6	3.48	14	3.51	21	3.57	29	3.62
7	3.48	15	3.54	22	3.59	30	3.62
8	3.47			23	3.59	31	3.63

SANTA YNEZ RIVER BASIN.

GENERAL FEATURES.

Santa Ynez River is the only important stream lying wholly in Santa Barbara County. Its drainage basin lies north of the Santa Ynez Mountains, extending for a distance of about 80 miles parallel to the coast line, and comprising approximately 900 square miles. Four-fifths of this area is mountainous, including the north slope of the Santa Ynez and the south slope of the San Rafael Mountains, and furnishes practically all of the run-off.

Santa Ynez River rises near the boundary line between Ventura and Santa Barbara counties, where the Santa Ynez and San Rafael ranges merge, flows nearly due west, and enters the Pacific Ocean at Surf, about 8 miles north of Point Arguello lighthouse, where the coast line makes a sharp turn to the north.

Small tributaries are numerous, but the only one of importance is Mono Creek, which drains 120 square miles of the southern slope of the San Rafael Mountains, and joins the Santa Ynez River about 13 miles below its source.

SANTA YNEZ RIVER NEAR SANTA BARBARA, CAL.

This station was originally established on November 21, 1902, above the mouth of Mono Creek. On November 1, 1903, the station was moved downstream about 5 miles to a point about one-fourth mile below the Gibraltar dam site, in the NE. ¼ NE. ¼ sec. 15, T. 5 N., R. 27 W., S. B. M., and about 12 miles north of Santa Barbara.

Mono Creek enters about 3½ miles above the station. No water is diverted above the gage. Water rights far exceed the mean low-water flow of the stream. The drainage area above the station is about 207 square miles.

The staff gage, in three sections, is on the right bank, about 300 yards below the north portal of the Santa Barbara city waterworks tunnel now under construction. The gage datum at the new station has not been changed. No records were obtained during 1909.

The channel is composed of sand and gravel and is fairly permanent. As no discharge measurements have been made recently, no estimates of daily discharge have been prepared for 1910.

The station is maintained by the city of Santa Barbara. The gage-height record has been furnished by the board of water commissioners through their engineer, Lee M. Hyde.

Daily gage height, in feet, of Santa Ynez River near Santa Barbara, Cal., for 1910.

[Andrew Packard, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	.....	2.0	.....	.....	1.45	1.25	1.05	1.0	.....	1.1	1.2
2	.....	2.0	.....	.....	1.45	1.25	1.05	1.0	.....	1.1	1.2
3	.....	2.0	.....	.....	1.45	1.2	1.05	1.0	.....	1.1	1.2
4	.....	2.0	2.25	.....	1.4	1.2	1.05	1.0	.....	1.15	1.2
5	.....	2.0	2.25	.....	1.4	1.2	1.05	1.0	.....	1.15	1.2
6	2.0	1.95	2.25	.....	1.4	1.2	1.05	1.0	.....	1.15	1.2
7	2.0	1.95	2.25	.....	1.4	1.2	1.05	1.0	.....	1.15	1.2
8	2.0	1.95	2.2	.....	1.4	1.2	1.05	1.0	.....	.....	1.2
9	2.0	1.95	2.2	.....	1.4	1.2	1.05	1.0	.....	1.15	1.2
10	2.0	1.95	2.2	.....	1.4	1.15	1.05	1.0	.....	1.2	1.2
11	2.0	1.95	2.1	1.7	1.4	1.15	1.05	1.0	.....	1.2	1.2
12	2.0	1.95	2.05	1.7	1.4	1.1	1.05	1.0	1.1	1.2	1.2
13	2.0	1.95	2.05	1.7	1.4	1.1	1.05	1.0	1.1	1.2	1.2
14	2.0	2.0	2.05	1.7	1.4	1.1	1.05	1.0	1.1	1.2	1.2
15	2.0	2.0	2.05	1.7	1.4	1.1	1.05	1.8	1.1	1.2	1.2
16	2.0	1.95	2.05	1.7	1.4	1.1	1.05	1.8	1.1	1.2	1.2
17	2.0	1.95	2.0	1.55	1.4	1.1	1.05	1.6	1.1	1.2	1.2
18	2.0	1.95	2.0	1.65	1.4	1.1	1.05	1.4	1.1	1.2	1.2
19	2.0	1.95	2.0	1.65	1.4	1.1	1.05	1.2	1.1	1.2	1.2
20	2.0	1.95	2.0	1.65	1.35	1.1	1.05	1.2	1.1	1.2	1.2
21	2.0	1.95	2.0	1.65	1.35	1.1	1.05	1.2	1.1	1.2	1.2
22	2.0	.....	2.0	1.6	1.35	1.1	1.05	1.2	1.1	1.2	1.2
23	2.0	.....	2.0	1.6	1.35	1.1	1.05	1.2	1.1	1.2	.....
24	2.0	2.0	2.0	1.6	1.3	1.1	1.05	1.15	1.1	1.2	1.2
25	2.0	2.8	.....	1.6	1.3	1.1	1.05	.....	1.1	1.2	1.2
26	2.0	2.8	.....	1.6	1.3	1.1	1.0	.....	1.1	1.2	1.25
27	2.0	2.9	.....	1.55	1.25	1.1	1.0	.....	1.1	1.2	1.25
28	2.0	2.0	.....	1.55	1.25	1.1	1.0	.....	1.1	1.2	1.25
29	.....	.....	.....	1.55	1.2	1.05	1.0	.....	1.1	1.2	1.25
30	.....	.....	.....	1.5	1.25	1.05	1.0	.....	1.1	1.2	1.25
31	.....	.....	.....	1.5	.....	1.05	1.0	.....	1.1	.....	1.2

SANTA YNEZ RIVER NEAR LOMPOC, CAL.

This station, which was established November 10, 1906, was originally located at the wagon bridge 1½ miles east of Lompoc, in La Misión Vieja de la Purísima land grant. Early in January, 1907, the bridge was destroyed by heavy floods. A new bridge was built during the summer of 1907, and the station was reestablished September 25, 1907, at the same location.

No tributaries enter the stream in the vicinity of the station and no diversions have been made above since the station was established. The headworks of canals previously diverting water were destroyed by floods and have not been reconstructed. Acquired water rights exceed the low flow of the stream. The drainage area above the station is about 785 square miles. There are several pumping plants above the station that obtain water for irrigation from wells along the banks of the stream.

The gage is a vertical staff on the pier of the bridge from which discharge measurements are made. The datum of the gage has remained unchanged since the station was established.

The conditions at this station are extremely unfavorable for accurate results. The channel is wide and the stream shifts constantly.

The estimates for 1910 can be considered fair for low stages and only approximate for high, as no high water measurements were obtained.

Discharge measurements of Santa Ynez River near Lompoc, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 30[a]	W. B. Clapp	149	157	4.10	309
Mar. 5	J. E. Stewart	163	83	3.84	112
Apr. 15	Donald McDonald	184	125	4.00	135
May 4[b]	do	170	81	3.90	98
27[b]	do	60	42	3.80	58
June 9[b]	J. E. Stewart	62	32	3.79	40
9[b]	do	52	32	3.79	42
Aug. 4[b]	Donald McDonald	57	25	3.55	20
Sept. 14[b]	C. C. Jacob	57	23	3.60	22

[a] Made from upstream side of bridge. [b] Made by wading about 1 mile above gage.

Daily gage height, in feet, of Santa Ynez River near Lompoc, Cal., for 1910.

[D. McDonald, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.65	4.0	3.9	4.4	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
2	5.0	4.0	3.8	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
3	4.8	4.0	3.8	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7
4	4.5	4.0	3.8	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7
5	4.4	3.9	3.8	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.7	3.7
6	4.4	3.9	3.85	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.7	3.7
7	4.4	3.9	3.85	4.2	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
8	4.3	3.9	3.8	4.2	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
9	4.3	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
10	4.2	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7

ıily gage height, in feet, of Santa Ynez River near Lompoc, Cal., for 1910—Contd.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	4.1	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
.....	4.1	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.6	3.7	3.7
.....	4.0	3.9	3.8	4.1	3.9	3.8	3.65	3.55	3.6	3.65	3.7	3.7
.....	4.0	3.9	3.9	4.1	3.9	3.8	3.65	3.55	3.6	3.65	3.7	3.7
.....	4.3	3.9	3.85	4.0	3.9	3.8	3.6	3.55	3.7	3.65	3.7	3.7
.....	4.4	3.9	3.8	4.0	3.9	3.8	3.6	3.6	3.7	3.65	3.7	3.7
.....	4.7	3.9	3.8	4.0	3.8	3.75	3.6	3.6	3.7	3.6	3.7	3.7
.....	4.5	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.65	3.6	3.7	3.7
.....	4.4	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.65	3.6	3.7	3.7
.....	4.3	3.9	3.9	4.0	3.8	3.75	3.6	3.6	3.6	3.6	3.7	3.8
.....	4.3	3.9	3.9	3.9	3.8	3.75	3.55	3.6	3.6	3.6	3.7	3.75
.....	4.2	3.9	4.5	3.9	3.8	3.75	3.55	3.6	3.6	3.6	3.7	3.75
.....	4.2	3.9	4.3	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.75
.....	4.2	3.9	4.2	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.7
.....	4.2	3.9	4.1	3.9	3.8	3.7	3.55	3.6	3.6	3.6	3.7	3.7
.....	4.2	3.9	4.1	3.9	3.8	3.7	3.6	3.6	3.6	3.6	3.7	3.7
.....	4.2	3.9	4.45	3.9	3.8	3.7	3.6	3.6	3.6	3.6	3.7	3.7
.....	4.1	3.9	4.9	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
.....	4.1	.....	4.6	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
.....	4.1	.....	4.5	3.9	3.8	3.7	3.55	3.6	3.6	3.65	3.7	3.7
.....	4.0	.....	4.5	.....	3.8	.....	3.55	3.6	.....	3.65	.....	3.7

)aily discharge, in second-feet, of Santa Ynez River near Lompoc, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	11,100	225	150	550	95	52	30	20	22	22	22	30
.....	1,580	225	90	385	95	51	30	20	22	22	22	30
.....	1,200	225	90	380	95	49	30	20	22	22	22	30
.....	750	225	90	275	95	48	30	20	22	22	26	30
.....	620	150	90	275	95	47	30	20	22	22	30	30
.....	620	150	120	275	95	46	30	20	22	22	30	30
.....	620	150	120	275	95	44	26	20	22	22	30	30
.....	500	150	90	275	95	43	26	20	22	22	30	30
.....	500	150	90	197	95	42	26	20	22	22	30	30
.....	400	150	90	197	95	42	26	20	22	22	30	30
.....	310	150	90	197	95	42	26	20	22	22	30	30
.....	310	150	90	197	95	42	26	20	22	22	30	30
.....	225	150	90	197	95	42	26	20	22	26	30	30
.....	225	150	150	197	95	42	26	20	22	26	30	30
.....	500	150	120	138	95	42	22	20	30	26	30	30
.....	620	150	90	138	95	42	22	22	30	26	30	30
.....	1,040	150	90	138	58	36	22	22	30	22	30	30
.....	750	150	150	138	58	36	22	22	26	22	30	30
.....	620	150	150	138	58	36	22	22	26	22	30	30
.....	500	150	150	138	58	36	22	22	22	22	30	42
.....	500	150	150	95	58	36	20	22	22	22	30	36
.....	400	150	740	95	58	36	20	22	22	22	30	36
.....	400	150	480	95	58	30	20	22	22	22	30	36
.....	400	150	375	95	58	30	20	22	22	22	30	30
.....	400	150	275	95	58	30	20	22	22	22	30	30
.....	400	150	270	95	58	30	22	22	22	22	30	30
.....	400	150	615	95	58	30	22	22	22	22	30	30
.....	310	150	1,260	95	57	30	20	22	22	26	30	30
.....	310	.....	785	95	56	30	20	22	22	26	30	30
.....	310	.....	640	95	54	30	20	22	22	26	30	30
.....	225	.....	625	.....	53	.....	20	22	.....	26	.....	30

RE.—Daily discharge determined from rating curves applicable as follows: Jan. 1 to Mar. 21, poorly ɛd and only approximate above 400 second-feet; Mar. 22 to Apr. 3, indirect method for shifting channels; ł to May 27, poorly defined; June 9 to Dec. 31, poorly defined. Discharge interpolated May 28 to June 8.

Monthly discharge of Santa Ynez River near Lompoc, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	11,100	225	872	53,600	D.
February	225	150	161	8,940	C.
March	1,260	90	271	16,700	C.
April	550	95	188	11,200	C.
May	95	53	76.7	4,720	C.
June	52	30	39.1	2,330	C.
July	30	20	24.0	1,480	C.
August	22	20	21.0	1,290	C.
September	30	22	23.1	1,370	C.
October	26	22	23.0	1,410	C.
November	30	22	29.1	1,730	C.
December	42	30	31.0	1,910	C.
The year	11,100	20	147	107,000	

SALINAS RIVER BASIN.[1]

ARROYO SECO NEAR SOLEDAD, CAL.

The Salinas River basin lies almost wholly in Monterey and San Luis Obispo counties, and comprises an area about 4,780 square miles in extent, having a length of 150 miles northwest-southeast and a maximum width of about 45 miles.

The Salinas rises on the eastern slope of the Santa Lucia Range, near the southern end of the basin and flows northwestward, parallel to the coast, to its mouth, about 4 miles southwest of Castroville.

The river has many tributaries, all as torrential and erratic as the Salinas itself, which has a very heavy discharge in winter and no surface run-off in summer ordinarily except below Soledad. The most important tributaries from north to south are Arroyo Seco, San Antonio River, and Nacimiento River from the west and San Lorenzo and Estrella creeks from the east. The tributaries from the west are peculiar in that they lie west of secondary ranges parallel to the main range and flow southeastward for the greater part of their length, parallel but in a course directly opposite to the general course of Salinas River.

The gaging station on Arroyo Seco was established January 1, 1901, at Pettitt's ranch, about 15 miles south of Soledad, in sec. 21, T. 19 S., R. 6 E.

No water is diverted above the station. The Clark Colony Water Co., irrigating about 4,000 acres, and the Spreckles Sugar Co. about 3,500 acres, divert water 1½ and 3 miles, respectively, below the station. These canals head above the broad wash of gravel and sand into which the low-water sinks and disappears, and from which the stream receives the name Arroyo Seco.

The staff gage is in two sections on the right bank.

[1] For a detailed discussion of the water resources of Salinas Valley see Water-Supply Paper 89.

Discharge measurements are made from a cable 300 feet below the gage. The channel shifts more or less during high water, and the current is very swift. Measurements made at such stages may be considerably in error.

The 1910 rating curve is fairly well defined and the record may be considered fair.

Discharge measurements of Arroyo Seco near Soledad, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	Charles Pettitt	122	255	6.88	546
30	do	121	196	6.20	247
Feb. 11	do	119	154	5.90	137
17	do	107	147	5.80	105
27	do	107	139	5.75	88
Mar. 6	J. E. Stewart	106	142	5.70	79
15	Charles Pettitt	107	141	5.72	86
20	do	128	380	7.88	1,260
27	do	126	306	7.20	798
Apr. 3	do	123	208	6.33	331
11	do	122	181	6.10	219
18	do	121	156	5.88	134
26	do	50	44	5.75	115
May 4	do	61	46	5.70	95
8	do	61	43	5.65	86
15	do	60	37	5.55	58
23	do	58	33	5.52	52
30	do	54	24	5.45	34
June 5	do	54	24	5.42	33
13	do	53	23	5.38	30
19	do	29	15	5.35	18
26	do	28	14	5.30	14
July 3	do	27	13	5.25	13
10	do	25	11	5.20	9
17	do	24	8.9	5.15	6.8
25	do	22	6.4	5.08	3.6
30	do	20	5.5	5.05	2.7
Aug. 21[a]	do	8	3.7	4.98	1.2
Sept. 11[a]	do	8	3.2	4.80	1.0
21[a]	do	10	4.8	5.12	2.9
Oct. 31[a]	do	11	6.7	5.20	7.8
Dec. 1[a]	do	27	14	5.35	14

[a] Measurement not made at cable section.

Daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1910.

[Mrs. Chas. Pettitt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.15	6.15	5.75	6.5	5.7	5.4	5.25	5.05	4.93	5.1	5.2	5.35
2	6.5	6.15	5.75	6.4	5.7	5.4	5.25	5.05	4.93	5.1	5.25	5.35
3	6.4	6.1	5.7	6.35	5.7	5.4	5.24	5.04	4.92	5.1	5.25	5.35
4	6.2	6.0	5.7	6.28	5.7	5.4	5.24	5.03	4.91	5.1	5.25	5.4
5	6.0	6.0	5.7	6.20	5.7	5.4	5.22	5.03	4.90	5.1	5.25	5.4
6	5.95	5.95	5.7	6.20	5.7	5.4	5.22	5.03	4.89	5.1	5.25	5.4
7	5.9	6.0	5.7	6.15	5.7	5.4	5.21	5.02	4.86	5.1	5.25	5.35
8	5.9	6.0	5.7	6.1	5.7	5.4	5.21	5.01	4.84	5.1	5.25	5.35
9	5.85	5.95	5.7	6.1	5.65	5.4	5.20	5.00	4.82	5.1	5.25	5.35
10	5.85	5.9	5.7	6.05	5.65	5.4	5.20	5.00	4.81	5.1	5.25	5.4
11	5.8	5.9	5.65	6.1	5.6	5.4	5.20	5.00	4.80	5.12	5.3	5.4
12	5.8	5.9	5.65	6.05	5.6	5.4	5.19	5.00	4.78	5.18	5.3	5.45
13	5.75	5.85	5.65	6.0	5.6	5.4	5.16	4.98	4.72	5.3	5.3	5.45
14	6.6	5.85	5.7	6.0	5.6	5.4	5.16	4.98	4.70	5.3	5.3	5.4
15	7.06	5.85	5.7	5.95	5.55	5.4	5.15	4.98	4.78	5.25	5.3	5.4

Daily gage height, in feet, of Arroyo Seco near Soledad, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	7.05	5.8	5.7	5.9	5.55	5.35	5.15	4.98	4.80	5.25	5.3	5.4
17	6.8	5.8	5.7	5.9	5.55	5.35	5.15	4.98	5.15	5.25	5.3	5.4
18	6.5	5.8	5.7	5.9	5.55	5.35	5.15	4.98	5.15	5.2	5.3	5.4
19	6.4	5.8	5.7	5.85	5.55	5.35	5.13	4.98	5.14	5.2	5.3	5.4
20	6.35	5.8	6.8	5.85	5.55	5.35	5.13	4.98	5.14	5.2	5.3	5.4
21	6.25	5.75	8.7	5.85	5.55	5.35	5.12	4.98	5.13	5.2	5.3	5.4
22	6.2	5.75	8.6	5.8	5.5	5.35	5.10	4.98	5.13	5.2	5.3	5.4
23	6.1	5.85	7.6	5.8	5.5	5.35	5.10	4.98	5.12	5.2	5.3	5.4
24	7.35	5.8	7.05	5.8	5.5	5.3	5.09	4.97	5.12	5.2	5.3	5.4
25	6.9	5.8	6.75	5.75	5.5	5.3	5.09	4.96	5.12	5.2	5.35	5.4
26	6.7	5.8	6.6	5.75	5.5	5.3	5.09	4.95	5.12	5.2	5.35	5.4
27	6.5	5.75	7.5	5.75	5.45	5.3	5.08	4.95	5.12	5.2	5.35	5.4
28	6.35	5.75	7.0	5.75	5.45	5.25	5.08	4.94	5.12	5.2	5.35	5.4
29	6.3	.....	6.8	5.7	5.45	5.25	5.06	4.93	5.12	5.2	5.35	5.4
30	6.2	.....	6.7	5.7	5.45	5.25	5.05	4.93	5.12	5.2	5.35	5.4
31	6.2	.....	6.6	.....	5.45	.....	5.05	4.93	.....	5.2	.....	5.4

Daily discharge, in second-feet, of Arroyo Seco near Soledad, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,360	238	100	385	86	27	12	2.6	1.2	3.5	8	21
2	385	238	100	342	86	27	12	2.6	1.2	3.5	12	21
3	342	217	86	321	86	27	11	2.5	1.2	3.5	12	21
4	258	179	86	292	86	27	11	2.3	1.1	3.5	12	27
5	179	179	86	258	86	27	9.4	2.3	1.0	3.5	12	27
6	162	162	86	258	86	27	9.4	2.3	1.0	3.5	12	27
7	144	179	86	238	86	27	8.7	2.1	.9	3.5	12	21
8	144	179	86	217	86	27	8.7	2.0	.8	3.5	12	21
9	128	162	86	217	74	27	8	1.8	.8	3.5	12	21
10	128	144	86	198	74	27	8	1.8	.7	3.5	12	27
11	113	144	74	217	62	27	8	1.8	.7	4.4	15	27
12	113	144	74	198	62	27	7.6	1.8	.7	7.1	15	34
13	100	128	74	179	62	27	6.2	1.6	.5	15	15	34
14	430	128	86	179	62	27	6.2	1.6	.5	15	15	27
15	662	128	86	162	52	27	5.8	1.6	.7	12	15	27
16	662	113	86	144	52	21	5.8	1.6	.7	12	15	27
17	530	113	86	144	52	21	5.8	1.6	5.8	12	15	27
18	385	113	86	144	52	21	5.8	1.6	5.8	8	15	27
19	342	113	86	128	52	21	4.8	1.6	5.3	8	15	27
20	321	113	530	128	52	21	4.8	1.6	5.3	8	15	27
21	279	100	1,780	128	52	21	4.4	1.6	4.8	8	15	27
22	258	100	1,700	113	42	21	3.5	1.6	4.8	8	15	27
23	217	128	985	113	42	21	3.5	1.6	4.4	8	15	27
24	830	113	662	113	42	15	3.3	1.6	4.4	8	15	27
25	580	113	505	100	42	15	3.3	1.5	4.4	8	21	27
26	480	113	430	100	42	15	3.3	1.4	4.4	8	21	27
27	385	100	920	100	34	15	3.2	1.4	4.4	8	21	27
28	321	100	635	100	34	12	3.2	1.3	4.4	8	21	27
29	300	.....	530	86	34	12	2.8	1.2	4.4	8	21	27
30	258	.....	480	86	34	12	2.6	1.2	4.4	8	21	27
31	258	.....	430	.....	34	.....	2.6	1.2	.....	8	.....	27

NOTE.—Daily discharge determined from a fairly well defined discharge rating curve.

Monthly discharge of Arroyo Seco near Soledad, Cal., for 1910.

[Drainage area, 215 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,360	100	357	1.66	1.91	22,000	B.
February	238	100	142	.660	.69	7,890	B.
March	1,780	74	362	1.68	1.94	22,300	B.
April	385	86	180	.837	.93	10,700	B.
May	86	34	59.0	.274	.32	3,630	B.
June	27	12	22.3	.104	.12	1,330	B.
July	12	2.6	6.28	.029	.03	386	B.
August	2.6	1.2	1.75	.0081	.009	108	B.
September	5.8	.5	2.69	.013	.01	160	B.
October	15	3.5	7.24	.034	.04	445	B.
November	21	8.0	15.1	.070	.08	898	B.
December	34	21	26.3	.122	.14	1,620	B.
The year	1,780	.5	98.5	.458	6.22	71,500	

SAN FRANCISCO BAY DRAINAGE BASINS.

The great central valley of California, including an area about 64,000 square miles in extent lying between the Coast Range on the west and the Sierra Nevada on the east, is drained by two trunk streams. From the north comes the Sacramento; from the south the San Joaquin; both discharge their waters into Suisun Bay, whence they find outlet through Carquinez Strait and San Pablo Bay into San Francisco Bay, passing finally through the Golden Gate into the Pacific Ocean.

SAN JOAQUIN RIVER SYSTEM.

GENERAL FEATURES.

The San Joaquin drainage basin is the southern lobe of the great central basin of California and lies southeast of an imaginary line drawn from San Francisco Bay to Lake Tahoe. The rim of the basin is determined by the crest of the Sierra Nevada at the east, the Tehachapi Range at the south, and the Coast Range at the west. The basin is somewhat larger than the Sacramento Basin, with which it merges at the north. It has a length of about 280 miles northwest-southeast and a width of about 125 miles. It is roughly rectangular in shape, and comprises a total area of about 32,700 square miles.

San Joaquin River rises in the high Sierra south of the Yosemite National Park, about halfway between the north and south ends of the basin, and flows southwestward to the trough of the San Joaquin Valley, whence it takes a northwestward course to its mouth. It has a total length of approximately 350 miles—125 miles in the mountains and 225 in the valley. It discharges into Suisun Bay, about 50 miles

by water from San Francisco. It is navigable as far as Stockton, about 50 miles above its mouth.

All the important tributaries of San Joaquin drain parts of the western slope of the Sierra, take a course parallel to the upper San Joaquin—that is, southwestward—and enter from the east. In order from south to north they are Fresno, Chowchilla, Merced, Tuolumne, Stanislaus, Calaveras, and Mokelumne rivers. The principal streams from the Sierra south of the upper San Joaquin, in order from north to south, are Kings, Kaweah, Tule, and Kern rivers. These last-named streams, however, are not directly tributary to the San Joaquin, for they are lost in the Tulare Lake depression, which, under normal conditions, has no suface outlet to the San Joaquin. Kings River discharges partly into Tulare Lake and partly into the San Joaquin. Besides the North, Middle, and South forks, the upper San Joaquin has many smaller tributaries.

SAN JOAQUIN RIVER NEAR FRIANT, CAL.[1]

This station, which is located in the SE. ¼ sec. 34, T. 10 S., R. 21 E., at the Fort Miller ranch house, about 4 miles above the town of Friant, was established Oct. 18, 1907.

No important tributaries enter near the station and no water is diverted above except for water-power development, all such diverted water being returned to the river channel above the station. The entire flow of the stream is controlled by existing water rights, involving all irrigable lands tributary to San Joaquin River.

The staff gage is in two sections on the left bank; no change has been made in the gage datum since the station was established. Discharge measurements are made from a cable near the gage.

Conditions for obtaining accurate discharge data are fair. At low stages the current is very sluggish, but at such times check measurements can be made from the bridge at Friant. The channel is subject to slight changes which may somewhat affect the accuracy.

The 1909 curve was slightly revised for 1910 and is well defined. The record may be considered excellent.

Discharge measurements of San Joaquin River near Friant, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 7	J. E. Stewart	227	1,350	4.78	1,480
Apr. 4	do	236	1,310	6.36	3,640
May 14	do	249	2,170	8.74	7,540
30	do	255	2,270	9.52	9,750
July 14	W. V. Hardy	222	1,200	4.85	1,520
19	do	228	1,310	5.32	2,150
Aug. 24	J. E. Stewart	222	958	3.78	529
Sept. 28	do	222	900	3.45	342

[1] Town formerly known as Pollasky.

Daily gage height, in feet, of San Joaquin River near Friant, Cal., for 1910.

[E. G. Davis, Observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.3	5.1	4.9	5.8	7.85	9.9	5.3	4.35	3.65	.....	3.65	3.45
2	9.4	5.1	5.25	5.9	7.8	9.9	5.3	4.3	3.6	.....	3.55	3.45
3	7.1	4.95	5.45	6.05	8.2	8.85	5.2	4.2	3.6	.....	3.55	3.5
4	6.5	4.95	5.95	6.2	7.55	8.3	5.1	4.2	3.65	.....	3.5	3.6
5	6.3	4.9	5.95	6.8	7.05	8.1	4.9	4.15	3.6	3.5	3.5	3.6
6	6.0	4.85	6.0	6.5	7.2	7.0	4.7	4.1	3.6	3.5	3.5	3.6
7	5.7	4.8	6.2	6.75	7.55	6.8	4.75	4.05	3.55	3.5	3.5	3.6
8	5.5	4.9	6.2	7.1	8.7	6.6	4.9	4.05	3.5	3.5	3.5	3.7
9	5.35	4.9	6.25	7.55	9.0	6.5	5.0	4.0	3.5	3.5	3.5	3.75
10	5.25	4.8	6.4	7.75	9.0	6.65	5.05	3.95	3.45	3.5	3.45	3.7
11	5.15	4.7	6.25	7.45	9.05	6.8	4.95	3.95	3.45	3.5	3.45	3.75
12	4.95	4.8	6.4	7.0	9.25	7.0	5.05	3.95	3.4	4.1	3.4	4.75
13	4.95	4.85	6.5	6.8	9.2	7.0	5.0	3.9	3.4	3.7	3.5	4.5
14	5.0	4.9	6.45	7.4	8.95	6.8	4.9	3.85	3.5	3.8	3.9	3.9
15	5.2	4.9	6.25	7.7	9.45	6.45	4.85	3.8	3.45	3.8	3.8	3.9
16	8.5	4.9	5.85	8.0	9.35	5.9	4.8	3.8	4.5	3.85	3.6	3.8
17	6.2	4.85	5.7	8.6	8.85	5.95	4.7	3.8	5.0	3.95	3.6	3.8
18	5.7	4.9	6.0	8.8	8.35	5.85	5.2	3.8	8.0	3.9	3.6	3.7
19	5.5	4.9	6.6	9.15	8.7	5.8	5.3	3.8	7.85	4.0	3.6	3.7
20	5.35	4.8	7.05	9.4	8.9	5.75	5.5	3.75	3.95	3.95	3.6	3.7
21	5.25	4.7	6.75	8.9	8.8	5.7	5.15	3.75	3.65	3.85	3.6	3.7
22	5.25	4.7	6.7	9.15	9.2	5.6	5.05	3.75	3.6	3.8	3.5	3.65
23	5.55	4.7	6.45	9.3	9.2	5.5	4.85	3.9	3.6	3.8	3.6	3.65
24	5.8	4.7	6.2	9.7	9.6	5.5	4.7	3.85	3.6	3.8	3.6	3.7
25	5.85	4.7	6.0	9.75	9.2	5.6	4.6	3.85	3.55	3.75	3.7	3.7
26	5.55	4.8	5.7	10.3	8.5	5.5	4.55	3.8	3.55	3.7	3.6	3.65
27	5.35	4.85	5.7	9.6	8.8	5.6	4.5	3.8	3.5	3.65	3.6	3.6
28	5.25	4.85	5.65	8.85	9.6	5.5	4.5	3.8	3.5	3.6	3.45	3.4
29	5.25	.....	5.5	8.4	9.6	5.5	4.55	3.75	3.45	3.6	3.45	3.5
30	5.25	.....	5.5	8.15	9.5	5.5	4.4	3.7	3.45	3.55	3.45	3.5
31	5.2	.....	5.55	.....	9.6	.....	4.4	3.7	.....	3.55	.....	3.6

Daily discharge, in second-feet, of San Joaquin River near Friant, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11,300	1,850	1,610	2,700	5,870	10,300	2,090	1,030	450	368	450	346
2	9,070	1,850	2,030	2,830	5,780	10,300	2,090	982	420	368	394	346
3	4,580	1,670	2,270	3,030	6,530	7,840	1,970	886	420	368	394	368
4	3,660	1,670	2,900	3,240	5,330	6,720	1,850	886	450	368	368	420
5	3,380	1,610	2,900	4,100	4,500	6,340	1,610	839	420	368	368	420
6	2,960	1,560	2,960	3,660	4,740	4,420	1,390	792	420	368	368	420
7	2,570	1,500	3,240	4,020	5,330	4,100	1,440	747	394	368	368	420
8	2,330	1,610	3,240	4,580	7,530	3,800	1,610	747	368	368	368	480
9	2,150	1,610	3,310	5,330	8,160	3,660	1,730	702	368	368	368	513
10	2,030	1,500	3,520	5,680	8,160	3,880	1,790	661	346	368	346	480
11	1,910	1,390	3,310	5,160	8,270	4,100	1,670	661	346	368	346	513
12	1,670	1,500	3,520	4,420	8,720	4,420	1,790	661	324	792	324	1,440
13	1,670	1,560	3,660	4,100	8,600	4,420	1,730	620	324	480	368	1,180
14	1,730	1,610	3,590	5,070	8,060	4,100	1,610	583	368	546	620	620
15	1,970	1,610	3,310	5,600	9,190	3,590	1,560	546	1,130	546	546	620
16	7,120	1,610	2,760	6,150	8,950	2,830	1,500	546	1,180	583	420	546
17	3,240	1,560	2,570	7,320	7,840	2,900	1,390	546	1,730	661	420	546
18	2,570	1,610	2,960	7,740	6,820	2,760	1,970	546	6,150	620	420	480
19	2,330	1,610	3,800	8,490	7,540	2,700	2,090	546	5,870	702	420	480
20	2,150	1,500	4,500	9,070	7,950	2,640	2,330	513	661	661	420	480
21	2,030	1,390	4,020	7,950	7,740	2,570	1,910	513	450	583	420	480
22	2,030	1,390	3,950	8,490	8,600	2,450	1,790	513	420	546	368	450
23	2,390	1,390	3,590	8,830	8,600	2,330	1,560	620	420	546	420	450
24	2,700	1,390	3,240	9,790	9,550	2,330	1,390	583	420	546	420	480
25	2,760	1,390	2,960	9,900	8,600	2,450	1,280	583	394	513	480	480
26	2,390	1,500	2,570	11,300	7,120	2,330	1,230	546	394	480	420	450
27	2,150	1,560	2,570	9,550	7,740	2,450	1,180	546	368	450	420	420
28	2,030	1,560	2,510	7,840	9,550	2,330	1,180	546	368	420	346	324
29	2,030	.....	2,330	6,920	9,550	2,330	1,230	513	346	420	346	368
30	2,030	.....	2,330	6,440	9,310	2,330	1,080	480	346	394	346	368
31	1,970	.....	2,390	.....	9,550	.....	1,080	480	.....	394	.....	420

NOTE.—Daily discharge determined from a well-defined discharge rating curve; discharge Oct. 1 to 4 estimated.

Monthly discharge of San Joaquin River near Friant, Cal., for 1910.

[Drainage area, 1,640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	11,300	1,670	3,060	1.87	2.16	188,000	A.
February	1,850	1,390	1,560	.951	.99	86,600	A.
March	4,500	1,610	3,050	1.86	2.14	188,000	A.
April	11,300	2,700	6,310	3.85	4.30	375,000	A.
May	9,550	4,500	7,730	4.71	5.43	475,000	A.
June	10,300	2,330	3,990	2.43	2.71	237,000	A.
July	2,330	1,080	1,620	.988	1.14	99,600	A.
August	1,030	480	644	.393	.45	39,600	A.
September	6,150	324	869	.530	.59	51,700	A.
October	792	368	482	.294	.34	29,600	A.
November	620	324	403	.246	.27	24,000	A.
December	1,440	324	510	.311	.36	31,400	A.
The year	11,300	324	2,520	1.54	20.88	1,830,000	

SAN JOAQUIN RIVER AT HERNDON, CAL.

This station is at the Southern Pacific Railroad bridge, in sec. 31, T. 12 S., R. 19 E., about 12 miles northwest of Fresno and 20 miles below Friant. In 1879 the engineering department of the Southern Pacific Co. set a staff gage on the old trestle bridge, which was used for the regular gaging station established at the beginning of 1895. In 1899 the trestle was replaced by a steel bridge, to the center pier of which a new vertical staff gage was placed at the datum of the old gage. Meter measurements were discontinued at the end of 1901, because of the continual change in the section due to shifting sand. Since that date only a gage record has been kept.

Gage records will no longer be published for this station, since without frequent discharge measurements they do not accurately indicate the discharge.

TULARE LAKE BASIN.

GENERAL FEATURES.

The Tulare Lake basin is situated near the south end of the San Joaquin Valley and embraces that part of the valley bounded by the Kings River delta at the north and the Kern River delta at the south.

Its lowest area lies in the trough of the valley and for several hundred years has been covered most of the time by a shallow fresh-water lake, the depth and extent of which have fluctuated with the season and the caprice of the delta rivers supplying it. Probably within the last hundred years the entire flow of Kern, Tule, and Kaweah rivers has entered this lake and a large part, if not all, of that of Kings River; but at the present time only the Kaweah and the Tule, south of Kings and north of Kern River, are wholly tributary

to the Tulare basin. At high stages Kings River discharges in part into this basin, and at times overflow may reach it from the Kern basin at the south.

TULARE LAKE IN KINGS COUNTY, CAL.

Tulare Lake is about 30 miles directly south of Fresno and 40 miles northwest of Bakersfield. The lake is roughly rectangular in shape and its greatest length is from northwest to southeast. In November, 1907, when its margin was carefully determined, the lake had an area of about 274 square miles, a maximum depth of 12.4 feet, an average length of 20 miles, and a width of 13.5 miles; the water's edge was 3 miles from the town of Corcoran, and the water surface about 12 feet below. The lake surface reached its greatest height in the summer of 1907, when it had a maximum depth of nearly 14 feet. Since July, 1907, it has been gradually subsiding.[1]

The lake bed resembles a flat saucer. The flat, level area in the bottom has an elevation of approximately 180 feet above mean sea level and covers about 55 square miles. The lowest point on the crest of the delta ridge to the north is about 27 feet higher than the bottom of the lake. Natural overflow will not occur, therefore, until the lake has a maximum depth of nearly 30 feet and an area of nearly 1,000 square miles.

During 1906 and a part of 1907 a record of the stage of the lake was kept by means of a Government staff gage located near the entrance of Kings River near Lemoore, Cal., at the middle of sec. 4, T. 21 S., R. 20 E., M. D. B. and M. The zero of the gage was at an elevation of 175.1 feet above mean sea level, or 4 feet below the bottom of the lake (elevation 179.1 feet). On May 11, 1907, a staff gage was set near Corcoran, Cal., referred to the same datum and used until July 30, 1909.

On July 28, 1910, a vertical staff gage, in two sections, was installed on the section line just south of the corner to secs. 27, 28, 33, and 34, T. 20 S., R. 20 E., about 10 miles south of Lemoore near Stratford post office. The datum on this gage is 171.0 feet above sea level.

All published gage records have been reduced to show the actual depth of the water on the lowest point of the lake bed.

Below is the gage record, showing the actual depth of the water in the lowest point of the lake bed, for 1910.

[1] The fluctuations in level of Tulare Lake are described in Water-Supply Paper U. S. Geol. Survey No. 271, 1911, pp. 171–174.

Daily gage height, in feet, of Tulare Lake in Kings County, Cal., for 1910.

[Mrs. J. E. Sanderson, observer.]

Day.	May.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Day.	May.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1			10.8				9.5	16			10.5	9.95	9.7		
2						9.6		17							
3								18							9.4
4			10.8		9.85			19						9.55	
5				10.2			9.4	20			10.4		9.65		
6						9.6		21		11.1					9.35
7								22							
8					9.8		9.3	23					9.6	9.55	
9			10.65					24			10.4	10.0			
10				10.0		9.55		25							
11								26					9.6		
12					9.75			27				9.95		9.5	9.35
13			10.6					28	12.3	10.95	10.3				
14								29							
15						9.55	9.25	30				9.9	9.6		
								31							

KERN RIVER BASIN.

GENERAL FEATURES.

The Kern River basin, the largest and most southern of all the areas tributary to the San Joaquin Valley from the Sierra, also extends farther east than any of the other basins and differs from them in that its main axis is north and south instead of east and west. It is long and comparatively narrow, and lies west of the main high Sierra divide, which separates it from the basins of Kaweah and Tule rivers and southern foothill streams at the west. It is separated from Kings River basin at the north by a cross range about 15 miles long, known as the Kings-Kern divide. To the east of this basin is the southern part of Owens Valley basin and the rough arid region south of Owens Lake and north of the Mohave Desert. The basin is about 85 miles long and 25 to 30 miles wide.

Kern River has its source in numerous glacial lakes nestling in the shadow of many high peaks on the main Sierra divide and on the Kings-Kern and the Great Western divides. The main stream flows directly southward for about 70 miles, then southwestward to the mouth of its canyon, a few miles northeast of Bakersfield, where it enters Kern basin, at the southern end of the San Joaquin Valley. No water from Kern River has reached the San Joaquin in recent years. The total length of Kern River from its source to Bakersfield is about 140 miles. Its total drainage area above the valley rim is about 2,570 square miles.

The chief tributary of Kern River is South Fork. Above the point of confluence the two streams have about equal lengths and drainage areas, and are parallel to each other and to the marginal rims. Each receives many short tributaries from the east and the west. The most important ones, however, Big Arroyo and Rattlesnake creeks and

Little Kern River from the west, and Gold Trout Creek from the east, enter the main stream above North Fork.

KERN RIVER AT ISABELLA, CAL.

This station was established October 5, 1910, at the wagon bridge about half a mile north of Isabella, in the SW. ¼ sec. 17, T. 26 S., R. 33 E.

Cowell Creek enters about 6 miles above and the South Fork joins the main river one-half mile below the station. Several small canals take water for irrigation above Isabella. To determine the total discharge of the river it is necessary to add the flow of the Kern River Power Co.'s canal. The intake of this canal is one-fourth mile below Kernville and about 3½ miles above the station.

The gage is a vertical staff fastened to a large cottonwood tree on the left bank. Discharge measurements are made from the bridge 100 feet above the gage.

The right bank is high; the left bank is overflowed during extreme high water. The channel is composed of gravel and cobblestones and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Kern River at Isabella, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 5	J. E. Stewart	.....	.....	0.70	[a] 1.0
Nov. 21[b]	H. J. Tompkins	10.5	6.2	.74	5.1

[a] Estimated. [b] Made by wading.

Daily gage height, in feet, of Kern River at Isabella, Cal., for 1910.

[Chas. T. Shook, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	0.8	.....	11	.....	.....	.....	21	.....	.....	.....
2	.....	.8	.....	12	.....	0.8	0.7	22	1.0	.....	.....
3	.....	.....	.....	13	0.8	.8	.....	23	[a] 2.0	0.8	.....
4	.....	.....	.....	14	.8	.8	.7	24	.....	.....	.....
5	0.7	.....	.....	15	.....	.8	.....	25	.....	.8	.....
6	.7	.....	.....	16	.....	.....	.7	26	.....	.8	.....
7	.....	.....	.....	17	.....	.8	.7	27	.....	.....	.....
8	.7	.8	.....	18	.....	.....	.....	28	.8	.....	.....
9	.....	.8	0.7	19	1.0	.8	.7	29	.8	.....	.....
10	.7	.....	.....	20	1.0	.....	.7	30	.....	.....	.....
								31	.....	.....	.....

[a] Rise caused by water being turned out of Kern River Power Co. Canal.

KERN RIVER NEAR BAKERSFIELD, CAL.

This station, which has been maintained by the Kern County Land Co. to furnish a basis for the equitable division of the water of Kern River between different appropriators, is located at the mouth of the lower canyon, about 5 miles northeast of Bakersfield, at what is known as the "first point of measurement," in sec. 2, T. 29 S., R. 28 E. It was established September 29, 1893, by Walter James, chief engineer of the Kern County Land Co.

No tributaries enter below the station and only a few unimportant ones for 50 miles above.

Water diverted for power development above the station is returned to the river. Except for local irrigation in the valleys around Kernville no water is diverted for irrigation above the station. Below the point of measurement, however, the total flow of the river, except at flood stages, is diverted by the Kern County Land Co. and the Miller & Lux interests, which own all the water rights on lower Kern River.

The gage height record is obtained by an automatic water-stage register. Discharge measurements are made from the footbridge near the gage.

Determinations of daily discharge are published as furnished by the Kern County Land Co. through its engineer, A. K. Warren. Frequent discharge measurements are made and the record is excellent.

Daily discharge, in second-feet, of Kern River near Bakersfield, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3,323	882	955	1,137	1,954	2,453	805	577	298	278	332	301
2	3,270	880	1,038	1,180	1,910	2,397	745	561	291	270	331	295
3	2,036	831	1,136	1,229	1,889	2,210	691	544	294	267	334	309
4	1,571	827	1,211	1,333	1,888	1,980	694	516	293	268	339	321
5	1,318	881	1,306	1,397	1,812	1,833	713	486	289	256	341	339
6	1,195	889	1,397	1,446	1,722	1,754	621	465	276	243	337	353
7	1,143	854	1,415	1,413	1,708	1,616	557	444	262	249	332	321
8	1,136	881	1,459	1,371	1,845	1,479	546	417	252	250	334	327
9	1,166	883	1,520	1,420	2,016	1,377	576	397	255	252	334	325
10	1,125	886	1,534	1,545	2,201	1,346	611	394	251	253	332	320
11	1,083	879	1,513	1,663	2,219	1,389	627	377	248	268	338	319
12	1,045	854	1,505	1,663	2,154	1,489	642	390	248	261	336	336
13	993	872	1,536	1,547	2,139	1,400	628	416	248	297	330	354
14	993	853	1,562	1,490	2,261	1,311	634	392	260	315	326	334
15	1,002	914	1,599	1,519	2,236	1,268	631	393	282	328	322	319
16	972	938	1,439	1,612	2,338	1,212	606	383	320	329	313	312
17	984	913	1,445	1,796	2,336	1,124	582	364	339	354	305	320
18	907	875	1,526	1,782	2,147	1,083	549	350	375	370	302	320
19	871	841	1,614	1,942	2,071	1,065	908	341	353	370	297	312
20	896	866	1,679	2,043	2,059	1,029	1,095	334	334	378	294	335
21	881	925	1,694	2,078	2,008	1,003	987	332	312	378	293	334
22	888	863	1,540	2,031	1,955	988	883	330	302	361	295	337
23	966	909	1,450	2,078	2,040	957	795	333	302	344	307	339
24	943	901	1,361	2,145	2,079	941	734	347	298	341	309	340
25	964	888	1,285	2,188	2,111	921	679	351	288	346	302	340
26	907	882	1,229	2,162	2,034	905	624	342	289	341	307	341
27	887	881	1,195	2,255	2,004	908	594	333	287	331	302	326
28	898	910	1,226	2,257	2,194	897	593	338	282	329	290	309
29	907	.....	1,205	2,121	2,284	881	654	331	270	323	298	309
30	914	.....	1,178	2,026	2,366	848	612	323	276	312	308	305
31	888	.....	1,142	.....	2,422	.....	584	307	.....	307	.....	321

NOTE.—Record of daily discharge furnished by the Kern County Land Co., A. K. Warren, engineer in charge.

Monthly discharge of Kern River near Bakersfield, Cal., for 1910.

[Drainage area, 2,345 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	3,323	871	1,200	0.512	0.59	73,800
February	938	827	881	.376	.39	48,900
March	1,694	955	1,380	.588	.68	84,800
April	2,257	1,137	1,730	.738	.82	103,000
May	2,422	1,708	2,080	.887	1.02	128,000
June	2,453	848	1,340	.571	.64	79,700
July	1,095	546	684	.292	.34	42,100
August	577	307	394	.168	.19	24,200
September	375	248	289	.123	.14	17,200
October	378	243	309	.132	.15	19,000
November	341	290	317	.135	.15	18,900
December	359	285	325	.139	.16	20,000
The year	3,323	243	910	.388	5.27	660,000

NOTE.—Monthly discharge computed by the Geological Survey from the daily discharge determined by the Kern County Land Co.

SOUTH FORK OF KERN RIVER AT ISABELLA, CAL.

This station, which is located at the highway bridge at Isabella, in the NW. ¼ sec. 20, T. 26 S., R. 33 E., was established October 5, 1910.

Fay Creek and Kelso Creek enter about 10 miles above the station and the South Fork joins the main river about half a mile below Isabella. The station is below all diversions and the low-water flow is entirely used for irrigation. Twenty-eight ditches, ranging in capacity from 8 to 40 second-feet, divert water from this stream for irrigation in South Fork Valley. The upper ditches head about 20 miles above the mouth of the river.

The gage is a vertical staff fastened to the piling of the middle bent of the bridge.

Discharge measurements are made from the bridge.

Both banks are high and wooded and not subject to overflow. The channel, which is composed of sand, is somewhat shifting and the current is moderately swift.

This station is maintained in cooperation with the United States Forest Service.

No estimate of daily or monthly discharge has been prepared for 1910.

Discharge measurements of South Fork of Kern River at Isabella, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 5	J. E. Stewart	20	7.9	0.40	9.7
Nov. 21	H. J. Tompkins	33	26	.50	25

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Kern River at Isabella, Cal., for 1910.

[Chas. T. Shook, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		0.6		11				21			
2		.6		12		0.5	0.5	22	0.6		
3		.6		13	0.5	.5		23	.6	0.5	
4				14	.5	.5	.5	24			
5	0.4			15		.5		25		.4	
6	.4			16			.5	26		.5	
7				17		.5	.5	27			
8	.4	.5		18				28	.6		
9		.5	0.5	19	.6	.5	.5	29			
10	.4			20	.6		.5	30			
								31	.6		

WHITE RIVER BASIN.

DEER CREEK AT HOT SPRINGS, CAL.

White River and Deer Creek, its principal tributary, which drain an area in Tulare County south of Tule River, rise on the Greenhorn Mountains, a spur of the Sierra Nevada, in the Sequoia National Forest and flow westward. At flood stages their waters reach the lower part of the valley immediately south of Tulare Lake; during the low-water season both streams sink into the sand near the foothills.

Several ranches divert a small amount of water from both streams for irrigation, but as the amount of tillable land is small, the agricultural products are sufficient only to supply the local demand.

On Deer Creek, in the vicinity of Hot Springs, hot sulphur water issues from several large springs which have become noted for their curative properties.

The gaging station, which is located half a mile below Hot Springs post office in the Sequoia National Forest, and about 2½ miles above the mouth of Tyler Creek, was established October 7, 1910.

The gage is a vertical staff fastened to a tree on the left bank of the stream, 100 feet above the highway bridge from which discharge measurements are made at high water.

The banks are high and there is but one channel at all stages. The channel is composed of sand, gravel, and bowlders, and conditions favor good results.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by Stewart and Tompkins by wading 200 feet below gage:

October 7, 1910; width, 6.3 feet; area, 5 square feet; gage height, 0.39 foot; discharge, 2.2 second-feet.

Daily gage height, in feet, of Deer Creek at Hot Springs, Cal., for 1910.

[A. B. Patterson, forest supervisor, Sequoia National Forest, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1				11	0.50			21			
2				12	.49	0.48		22			
3		0.48	0.70	13	.48	.50		23			0.55
4		.50	.58	14				24			
5		.50	.53	15				25			
6		.48		16				26			
7	0.39			17				27			
8				18				28			
9				19				29			
10				20				30			
								31			.51

TULE RIVER BASIN.

GENERAL FEATURES.

Tule River drains a small, somewhat rectangular area lying south of the Kaweah basin, west of the Kern basin, and north of the Deer Creek basin. Its length north and south averages about 25 miles and its width averages about 15 miles. The total drainage area above the rim of the valley is about 370 square miles.

Tule River rises at an altitude of about 9,000 feet above sea level. The main stream is formed by the junction of North and Middle forks about 1 mile above Daunt post office and about 15 miles northeast of Portersville. It takes a southwesterly course to the point where it leaves the foothills about 5 miles east of Portersville, and has a length of about 30 miles. South Fork joins the main stream about 8 miles below Daunt. The flood water passes westward through old channels in the river's alluvial fan to Tulare Lake, which it enters south of Corcoran.

TULE RIVER NEAR PORTERSVILLE, CAL.

This station, which is located in the NW. ¼ NW. ¼ sec. 25, T. 21 S., R. 28 E., M. D. B. and M., 100 feet below the wagon bridge near McFarland's ranch, about 1 mile above the mouth of South Fork, about 8 miles east of Portersville, and about 9 miles below the junction of North and Middle forks, was established April 8, 1901.

A few small irrigation ditches divert water above the point of measurement. Below the station canals divert water for use chiefly in irrigating citrus fruits in the vicinity of Portersville. The acquired water rights exceed the minimum flow of the stream.

The staff gage is in two sections on the right bank. No change has ever been made in the gage datum.

Discharge measurements are made from the bridge about 100 feet above the gage.

The channel is practically permanent and the velocity moderate. Conditions favor accuracy of discharge data. The 1910 rating curve is well defined and the record may be considered excellent.

Discharge measurements of Tule River near Portersville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 10	J. E. Stewart	66	130	2.10	173
Mar. 22	W. B. Clapp	69	130	2.34	224
Apr. 7	J. E. Stewart	69	126	2.30	210
7	do	72	147	2.30	217
May 11	do	70	138	2.18	189
June 2[a]	do	53	97	1.62	90
July 11[a]	W. V. Hardy	45	43	.88	19
11[a]	do	35	23	.88	20
Aug. 20[a]	J. E. Stewart	15	8.6	.58	5.8
Oct. 9[a]	do	15	11	.75	11

[a] Measurement made by wading.

Daily gage height, in feet, of Tule River near Portersville, Cal., for 1910.

[R. W. McFarland, Martha Brough, observers.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.55	2.5	2.1	2.3	2.3	1.6	1.05	0.7	0.6	0.7	0.95	1.1
2	4.5	2.3	2.2	2.3	2.2	1.6	1.05	.7	.65	.7	1.0	1.1
3	3.2	2.2	2.2	2.3	2.2	1.55	1.05	.7	.65	.7	1.0	1.1
4	3.0	2.2	2.15	2.35	2.2	1.55	1.0	.7	.65	.7	1.05	1.6
5	2.85	2.2	2.1	2.3	2.1	1.5	1.0	.7	.65	.7	1.05	1.45
6	2.7	2.2	2.35	2.3	2.1	1.5	1.0	.65	.65	.7	1.05	1.4
7	2.6	2.2	2.35	2.3	2.1	1.45	.95	.65	.7	.7	1.05	1.3
8	2.55	2.15	2.35	2.3	2.1	1.45	.95	.65	.7	.7	1.05	1.2
9	2.5	2.15	2.4	2.3	2.15	1.4	.95	.65	.7	.7	1.05	1.2
10	2.4	2.15	2.35	2.3	2.15	1.4	.8	.65	.7	.75	1.05	1.2
11	2.3	2.1	2.3	2.5	2.15	1.35	.9	.6	.7	.85	1.05	1.2
12	2.25	2.1	2.25	2.5	2.15	1.3	.85	.6	.7	1.05	1.05	1.2
13	2.2	2.1	2.25	2.4	2.15	1.25	.8	.6	.75	1.05	1.05	1.2
14	2.2	2.1	2.8	2.4	2.15	1.3	.8	.6	.8	1.1	1.05	1.25
15	2.5	2.1	2.4	2.4	2.1	1.3	.8	.55	.8	1.1	1.05	1.25
16	3.0	2.1	2.3	2.4	2.0	1.3	.8	.55	.9	1.2	1.05	1.2
17	2.7	2.1	2.3	2.4	2.0	1.25	.8	.55	.85	1.15	1.1	1.2
18	2.5	2.1	2.3	2.4	2.0	1.25	.9	.55	.85	1.1	1.1	1.2
19	2.3	2.1	2.3	2.4	1.95	1.25	1.0	.6	.8	1.1	1.1	1.2
20	2.2	2.1	2.35	2.4	1.9	1.2	.9	.6	.8	1.05	1.1	1.4
21	2.2	2.1	2.35	2.5	1.9	1.2	.85	.6	.8	1.0	1.1	1.3
22	2.3	2.05	2.35	2.45	1.9	1.15	.8	.6	.75	1.0	1.1	1.3
23	2.3	2.05	2.35	2.4	1.9	1.1	.8	.6	.7	1.0	1.1	1.3
24	2.5	2.05	2.35	2.35	1.85	1.1	.8	.6	.7	1.0	1.1	1.3
25	2.45	2.05	2.3	2.35	1.85	1.1	.8	.6	.7	1.0	1.1	1.3
26	2.4	2.0	2.3	2.35	1.8	1.1	.75	.6	.7	1.0	1.15	1.25
27	2.35	2.05	2.3	2.35	1.75	1.1	.75	.6	.7	.95	1.15	1.25
28	2.3	2.1	2.3	2.35	1.7	1.05	.75	.6	.7	.95	1.15	1.25
29	2.3	.....	2.3	2.3	1.65	1.05	.7	.6	.7	.95	1.15	1.2
30	2.3	.....	2.3	2.3	1.6	1.05	.7	.6	.7	.95	1.1	1.2
31	2.3	.....	2.3	.....	1.6	.....	.7	.6	.....	.95	.....	1.2

Daily discharge, in second-feet, of Tule River near Portersville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,940	260	173	214	214	88	30	9	6	9	23	34
2	1,170	214	193	214	193	88	30	9	7.5	9	26	34
3	483	193	193	214	193	82	30	9	7.5	9	26	34
4	410	193	183	225	193	82	26	9	7.5	9	30	88
5	360	193	173	214	173	75	26	9	7.5	9	30	70
6	314	193	225	214	173	75	26	7.5	7.5	9	30	64
7	286	193	225	214	173	70	23	7.5	9	9	30	53
8	273	183	225	214	173	70	23	7.5	9	9	30	43
9	260	183	236	214	183	64	23	7.5	9	9	30	43
10	236	183	225	214	183	64	14	7.5	9	12	30	43
11	214	173	214	260	183	58	20	6	9	17	30	43
12	204	173	204	260	183	53	17	6	9	30	30	43
13	193	173	204	236	183	48	14	6	12	30	30	43
14	193	173	344	236	183	53	14	6	14	34	30	48
15	260	173	236	236	173	53	14	5	14	34	30	48
16	410	173	214	236	154	53	14	5	20	43	30	43
17	314	173	214	230	154	48	14	5	17	38	34	43
18	260	173	214	236	154	48	20	5	17	34	34	43
19	214	173	214	236	145	48	26	6	14	34	34	43
20	193	173	225	236	136	43	20	6	14	30	34	64
21	193	173	225	260	136	43	17	6	14	26	34	53
22	214	164	225	248	136	38	14	6	12	26	34	53
23	214	164	225	236	130	34	14	6	9	26	34	53
24	260	164	225	225	128	34	14	6	9	26	34	53
25	248	164	214	225	128	34	14	6	9	26	34	53
26	236	154	214	225	119	34	12	6	9	26	38	48
27	225	164	214	225	111	34	12	6	9	23	38	48
28	214	173	214	225	103	30	12	6	9	23	38	48
29	214	.....	214	214	96	30	9	6	9	23	38	43
30	214	.....	214	214	88	30	9	6	9	23	34	43
31	214	.....	214	.....	88	.....	9	6	.....	23	.....	43

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Tule River near Portersville, Cal., for 1910.

[Drainage area, 266 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,940	193	343	1.29	1.49	21,100	A.
February	260	154	180	.677	.70	10,000	A.
March	344	173	217	.816	.94	13,300	A.
April	260	214	229	.861	.96	13,600	A.
May	214	88	154	.579	.67	9,470	A.
June	88	30	53.5	.201	.22	3,180	A.
July	30	9	18.1	.068	.08	1,110	A.
August	9	5	6.60	.025	.03	406	A.
September	20	6	10.6	.040	.04	631	A.
October	43	9	22.2	.084	.10	1,360	A.
November	38	23	31.9	.120	.13	1,900	A.
December	88	34	48.5	.182	.21	2,980	A.
The year	1,940	5	109	.410	5.57	79,000	

NOTE.—This table does not include the small diversions for irrigation made above the gage. Hence the discharge per square mile and the run-off in inches are subject to error during irrigating season.

SOUTH FORK OF TULE RIVER NEAR SUCCESS, CAL.

This station, which is located at the Indian school on the Tule Indian reservation, 7 miles southeast of Success, was established October 10, 1910.

Rocky Creek enters about 2 miles above and the South Fork joins the main river about 10 miles below the gage. Thirteen small ditches, with an aggregate capacity of about 11 second-feet, divert water from the South Fork and tributaries above the station for irrigation on the reservation. The South Tule ditch heads about 4 miles below the station.

The gage is a vertical staff fastened to an alder on the left bank directly opposite the Indian school.

Discharge measurements are made by wading at medium and low stages. A car and cable for high-stage measurements have not yet been installed.

The bed of the stream, which is composed of bowlders, is rough, and the course of the channel is probably permanent. The current is swift at medium and high stages. Both banks are high and wooded and not liable to overflow.

This station is maintained in cooperation with the United States Office of Indian Affairs.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by Stewart and Tompkins by wading about ½ mile below gage:

October 11, 1910: Width, 9 feet; area, 9 square feet; gage height, 0.33 feet; discharge, 2.9 second-feet.

Daily gage height, in feet, of South Fork of Tule River near Success, Cal., for 1910.

[Allan Bowdish, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	0.50	0.71	11	0.33	0.50	0.50	21	0.42	0.66	0.94
2	.....	.49	.71	12	.26	.59	.50	22	.42	.64	.92
3	.....	.50	.71	13	.24	.64	.52	23	.42	.63	.80
4	.....	.62	.85	14	.24	.62	.54	24	.43	.63	.71
5	.....	.64	.80	15	.23	.61	.54	25	.44	.68	.65
6	.....	.59	.68	16	.60	.60	.55	26	.43	.70	.64
7	.....	.60	.57	17	.56	.60	.56	27	.43	.72	.64
8	.....	.58	.51	18	.52	.60	.55	28	.42	.72	.63
9	.....	.55	.50	19	.48	.62	.54	29	.42	.70	.60
10	0.21	.51	.48	20	.43	.66	.92	30	.42	.70	.57
								31	.43	.....	.56

KAWEAH RIVER BASIN.

GENERAL FEATURES.

Kaweah River drains an area comprising about 715 square miles, lying on the western slope of the Sierra in the northern part of Tulare County, south and west of the Kings River basin, north of the Tule River basin, and west of the upper Kern River basin.

The main stream is formed 10 or 15 miles above the head of its delta by the confluence of East and Middle forks, which rise in numerous

small lakes nestling among high peaks on or near the divide, at an altitude of about 12,000 feet above sea level, and its course is southwestward throughout its length. Below the foothills it divides into several distributaries which cross the delta fan and enter Tulare Lake near Corcoran. Its total length above the delta is about 45 miles.

KAWEAH RIVER NEAR THREE RIVERS, CAL.

This station, which is located in the SE. ¼ sec. 27, T. 17 N., R. 28 E., M. D. B. and M., about 1 mile southwest of Three Rivers post office and about one-fourth mile back of J. O. Carter's ranch house on the wagon road from Lemon Cove to Three Rivers, about three-fourths of a mile below the mouth of the South Fork and 3 miles below the mouth of the North Fork was established April 29, 1903.

No important tributaries enter below the point of measurement.

Some water is diverted above the station for power, particularly on Middle and East forks, but it is returned to the stream above Three Rivers. A few small ditches divert water for local irrigation and domestic uses in the small valleys above Three Rivers. The acquired water-rights on this stream probably exceed low-water flow.

The staff gage, the datum of which has not been changed since the station was established, is in two sections.

Discharge measurements are made from a cable at the gage.

The conditions for obtaining accurate discharge data are fairly good. The stream is confined to its channel except at very high stages, when the right bank is overflowed somewhat. The bed, though composed of fine gravel and sand, is not subject to much change. The current is somewhat sluggish at very low stages and rather swift at high stages, though not excessively so.

The 1910 rating curve is well defined and the record may be considered good.

Discharge measurements of Kaweah River near Three Rivers, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 9	J. E. Stewart	160	406	5.70	445
Apr. 6	....do	160	508	6.35	920
May 12	....do	166	599	6.92	1,560
June 1	....do	165	563	6.71	1,230
July 12	W. V. Hardy	133	296	5.10	185
Aug. 22[a]	J. E. Stewart	38	82	4.40	50
Oct. 12[a]	Stewart and Tompkins	50	72	4.80	134
Nov. 14[a]	H. J. Tompkins	48	56	4.60	80

[a] Measurement made by wading below the gage.

Daily gage height, in feet, of Kaweah River near Three Rivers, Cal., for 1910.

[J. O. Carter, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	8.8	6.0	5.85	6.2	6.8	6.7	5.3	4.75	4.4	4.3	4.45	4.5
2	7.05	5.75	5.95	6.25	6.8	6.6	5.2	4.65	4.4	4.3	4.5	4.5
3	6.6	5.8	6.1	6.3	6.8	6.45	5.2	4.6	4.4	4.3	4.5	4.6
4	6.3	5.8	6.1	6.4	6.7	6.35	5.2	4.6	4.4	4.3	4.5	5.1
5	6.2	5.75	6.2	6.5	6.5	6.3	5.1	4.6	4.4	4.3	4.55	4.8
6	6.15	5.75	6.2	6.4	6.6	6.2	5.1	4.55	4.35	4.3	4.55	4.7
7	6.1	5.75	6.2	6.35	6.8	6.1	5.1	4.5	4.35	4.3	4.5	4.7
8	6.0	5.7	6.3	6.4	6.85	6.05	5.1	4.5	4.35	4.3	4.5	4.65
9	5.95	5.7	6.3	6.5	7.05	6.0	5.05	4.5	4.3	4.3	4.5	4.65
10	5.9	5.7	6.25	6.6	6.9	6.0	5.1	4.5	4.3	4.3	4.5	4.65
11	5.85	5.7	6.25	6.55	7.0	6.0	5.0	4.5	4.3	4.45	4.5	5.3
12	5.8	5.7	6.25	6.5	7.0	6.0	5.05	4.5	4.3	4.8	4.6	5.15
13	5.8	5.75	6.25	6.4	7.1	6.15	5.0	4.45	4.3	4.65	4.6	4.95
14	5.8	5.8	6.45	6.5	7.1	5.9	5.0	4.45	4.35	4.6	4.6	4.8
15	5.9	5.8	6.25	6.6	7.1	5.75	5.0	4.45	4.6	4.7	4.55	4.75
16	6.65	5.7	6.1	6.75	7.05	5.7	4.9	4.4	4.6	4.8	4.55	4.7
17	6.2	5.7	6.2	6.9	6.9	5.8	4.9	4.4	4.6	4.7	4.55	4.65
18	6.0	5.7	6.35	7.0	6.8	5.7	5.6	4.4	4.5	4.8	4.55	4.65
19	5.9	5.7	6.45	7.1	6.8	5.7	5.7	4.4	4.45	4.8	4.6	4.65
20	5.9	5.7	6.4	7.1	6.8	5.65	5.3	4.4	4.4	4.75	4.6	4.7
21	5.9	5.65	6.3	7.0	6.7	5.65	5.1	4.4	4.4	4.7	4.6	4.7
22	5.95	5.65	6.35	7.1	6.8	5.6	5.0	4.4	4.4	4.65	4.55	4.65
23	6.1	5.6	6.3	7.1	6.8	5.55	4.95	4.4	4.35	4.65	4.55	4.7
24	6.0	5.6	6.2	7.15	6.8	5.5	4.9	4.4	4.35	4.6	4.55	4.65
25	5.95	5.7	6.2	7.3	6.75	5.55	4.85	4.4	4.25	4.6	4.55	4.65
26	5.9	5.7	6.1	7.1	6.7	5.55	4.9	4.4	4.35	4.55	4.6	4.65
27	5.9	5.75	6.1	7.2	6.8	5.55	4.9	4.4	4.3	4.5	4.6	4.6
28	5.9	5.75	6.05	6.95	6.8	5.5	4.9	4.4	4.3	4.5	4.6	4.6
29	5.9	.....	6.0	7.0	6.8	5.4	4.8	4.4	4.3	4.5	4.55	4.6
30	5.9	.....	6.1	6.9	6.8	5.3	4.75	4.4	4.3	4.5	4.5	4.6
31	5.9	.....	6.1	.....	6.8	.....	4.75	4.4	.....	4.5	.....	4.6

Daily discharge, in second-feet, of Kaweah River near Three Rivers, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,850	636	538	785	1,360	1,260	271	110	50	39	56	63
2	1,660	478	603	828	1,360	1,160	235	90	50	39	63	63
3	1,160	507	710	870	1,360	1,010	235	80	50	39	63	80
4	870	507	710	960	1,260	915	235	80	50	39	63	202
5	785	478	785	1,060	1,060	870	202	80	50	39	72	121
6	748	478	785	960	1,160	785	202	72	44	39	72	99
7	710	478	785	915	1,360	710	202	63	44	39	63	99
8	636	449	870	960	1,420	673	202	63	44	39	63	90
9	603	449	870	1,060	1,660	636	188	63	39	39	63	90
10	570	449	828	1,160	1,480	636	202	63	39	39	63	90
11	538	449	828	1,100	1,600	636	173	63	39	56	63	271
12	507	449	828	1,060	1,600	636	188	63	39	121	80	218
13	507	478	828	960	1,720	748	173	56	39	90	80	160
14	507	507	1,010	1,060	1,720	570	173	56	44	80	80	121
15	570	507	828	1,160	1,720	478	173	56	80	99	72	110
16	1,200	449	710	1,310	1,660	449	146	50	80	121	72	99
17	785	449	785	1,480	1,480	507	146	50	80	99	72	90
18	636	449	915	1,600	1,360	449	399	50	63	121	72	90
19	570	449	1,010	1,720	1,360	449	449	50	56	121	80	90
20	570	449	960	1,720	1,360	424	271	50	50	110	80	99
21	570	424	870	1,600	1,260	424	202	50	50	99	80	99
22	603	424	915	1,720	1,360	399	173	50	50	90	72	90
23	710	399	870	1,720	1,360	376	160	50	44	90	72	99
24	636	399	785	1,780	1,360	352	146	50	44	80	72	90
25	603	449	785	1,990	1,310	376	134	50	34	80	72	90
26	570	449	710	1,720	1,260	376	146	50	44	72	80	90
27	570	478	710	1,850	1,360	376	146	50	39	63	80	80
28	570	478	673	1,440	1,360	352	146	50	39	63	80	80
29	570	.....	636	1,600	1,360	310	121	50	39	63	72	80
30	570	.....	710	1,480	1,360	271	110	50	39	63	63	80
31	570	.....	710	.....	1,360	.....	110	50	.....	63	.....	80

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Kaweah River near Three Rivers, Cal., for 1910.

[Drainage area, 520 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,850	507	823	1.58	1.82	50,600	B.
February	636	399	466	.896	.93	25,900	A.
March	1,010	538	792	1.52	1.75	48,700	A.
April	1,990	785	321	.617	.69	19,100	A.
May	1,720	1,060	1,410	2.71	3.12	86,700	A.
June	1,260	271	587	1.13	1.26	34,900	A.
July	449	110	195	.375	.42	12,000	A.
August	110	50	59.9	.115	.13	3,680	B.
September	80	34	48.4	.093	.10	2,880	B.
October	121	39	72.1	.139	.16	4,430	B.
November	80	56	71.2	.137	.15	4,240	B.
December	271	63	107	.206	.24	6,580	A.
The year	4,850	34	414	.796	10.77	300,000	

NOTE.—Diversions for irrigation, the total of which is estimated at about 20 second-feet, are made on North Fork of Kaweah. Hence discharge per square mile and run-off in inches are subject to error during the irrigating season.

NORTH FORK OF KAWEAH RIVER AT KAWEAH, CAL.

This station, which is located at the highway bridge half a mile above Kaweah and about 2 miles above the mouth of the North Fork, was established October 12, 1910.

Sheep Creek enters 2½ miles above and Manikin Creek one-fourth mile below the gage. Several small ditches divert water for irrigation above the station. The total amount of water used is estimated at about 20 second-feet.

The vertical staff gage is fastened to the right abutment of the bridge from which discharge measurements are made.

Both banks are high and wooded and not subject to overflow. The bed of the stream is bed rock and sand. At low water the current is sluggish at the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Kaweah River at Kaweah, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 13	Stewart and Tompkins	14	17	0.80	17
Nov. 11	H. J. Tompkins	13	14	.66	12
12	....do	14	16	.73	13

NOTE.—Measurements made by wading about 1 mile below gage.

Daily gage height, in feet, of North Fork of Kaweah River at Kaweah, Cal., for 1910.

[G. W. Purdy, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	0.65	.....	11	.....	0.65	1.52	21	0.70	0.72	.....
2	.....	.62	.....	12	0.93	.74	.....	22	.65	.....	.....
3	.....	.63	0.78	13	.80	.81	1.05	23	.63	.....	.....
4	.....	.66	1.20	14	.....	.75	.95	24	.64	.....	.....
5	.....	.69	.90	15	.....	.....	.....	25	.65	.71	.....
6	.....	.65	.....	16	.....	.....	.90	26	.62	.82	0.83
7	.....	.65	.....	17	.....	.....	.83	27	.61	.78	.82
8	.....	.66	.82	18	.....	.....	.....	28	.61	.74	.....
9	.....	.65	.80	19	.....	.....	.....	29	.61	.....	.....
10	.....	.66	.80	20	.75	.....	.....	30	.61	.73	.....
								31	.63	.....	.....

KINGS RIVER BASIN.

GENERAL FEATURES.

Kings River drains an area comprising about 1,840 square miles, lying on the western slope of the Sierra, south of the upper San Joaquin basin and north of Kaweah and upper Kern basins.

The main stream is formed well up in the mountains by the confluence of the North, Middle and South forks, which rise in numerous glacial lakelets nestling at the foot of glaciers and perpetual snow banks which protrude from the summits of high peaks on and near the crest of the Sierra. It flows southwestward to the mouth of its canyon, about 10 miles northeast of Sanger, and across its delta fan to the trough of San Joaquin Valley, about 6 miles west of Lemoore. From this point most of the low-water flow passes northwestward through Kings Slough to San Joaquin River about 3 miles north of Mendota, but most of the flood flow passes southward to Tulare Lake. The total length of the river from its source to the mouth of its canyon is about 85 miles. Besides the three forks and their tributaries, the other principal tributaries are Dinkey and Big creeks from the north and Mill Creek from the south.

KINGS RIVER NEAR SANGER, CAL.

This station, which is located in the NW. ¼ sec. 8, T. 13 S., R. 24 E., M. D. B. and M., just below a big bend in the river near the mouth of the canyon, about 15 miles northeast of Sanger and southwest of Red Mountain, was established September 3, 1895.

No tributaries enter below the station. Mill Creek enters from the south about 3 miles above the point of measurement. Big and Dinkey creeks enter from the north about 10 and 15 miles, respectively, above the station. The forks unite 20 or 25 miles above.

No water is diverted immediately above the place of measurement. Many miles above, however, a small quantity of water is diverted from tributary streams into a flume used for transporting lumber from the

mountains to Sanger. The total flow of the river at low and moderate stages is diverted into irrigation canals only a short distance below the station. The acquired water rights greatly exceed the low-water flow.

A Friez automatic water-stage register is used for obtaining gage heights at this station, because of the remarkable diurnal fluctuations of stage, especially during the spring and early summer when the snow is melting rapidly. Not uncommonly the weekly record sheet shows a notably regular sinusoidal curve indicating an hourly change and a daily range of nearly 2 feet. (See fig. 1.) No change has ever been made in the gage datum.

Discharge measurements are made from a cable about 500 feet below the gage.

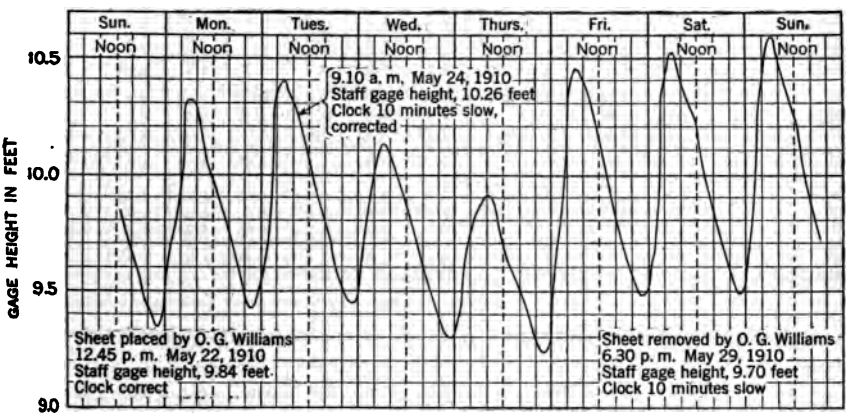


FIGURE 1.—Gage-height record of Kings River near Sanger, Cal., May 22-29, 1910.

The conditions for obtaining accurate discharge data at this station are very good. The stream is confined to its channel at all stages and the current is never too sluggish nor too swift. The channel has a gravel bottom but changes very little. The 1910 rating curve is well defined except at the lower stages and the record is excellent.

Discharge measurements of Kings River near Sanger, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 8	J. E. Stewart	154	549	5.74	1,350
Apr. 5	do	210	965	7.98	3,940
May 13	do	313	1,660	10.28	8,830
31	do	315	1,690	10.40	9,100
July 9	W. V. Hardy	160	621	6.11	1,620
18	do	202	899	7.61	3,030
Aug 23	J. E. Stewart	118	356	4.60	507
Sept. 29[a]	do	124	295	4.20	240

[a] Measurement made by wading.

Daily gage height, in feet, of Kings River near Sanger, Cal., for 1910.

[O. G. Williams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	11.85	6.2	6.0	6.9	9.2	10.15	6.5	5.25	4.4	4.2	4.35	4.3
2	8.8	6.0	6.3	7.1	9.1	9.9	6.4	5.2	4.4	4.2	4.35	4.3
3	7.8	5.95	6.5	7.25	9.35	9.4	6.25	5.1	4.4	4.2	4.3	4.3
4	7.2	6.0	6.7	7.5	8.9	9.15	6.05	5.05	4.45	4.2	4.3	4.65
5	6.8	6.0	6.85	7.9	8.55	8.95	5.8	5.0	4.4	4.15	4.3	4.5
6	6.55	5.9	6.95	7.65	8.6	8.6	5.7	4.95	4.4	4.15	4.3	4.45
7	6.3	5.85	7.0	7.55	9.2	8.3	5.8	4.9	4.35	4.15	4.3	4.45
8	6.15	5.75	7.1	7.95	9.7	8.05	5.95	4.85	4.35	4.15	4.3	4.45
9	6.1	5.7	7.3	8.4	9.9	7.95	6.05	4.8	4.3	4.1	4.25	4.45
10	6.1	5.7	7.3	8.65	9.75	8.05	6.05	4.75	4.3	4.1	4.25	4.45
11	6.0	5.7	7.3	8.6	9.85	8.3	6.05	4.7	4.3	4.1	4.25	5.3
12	5.9	5.7	7.35	8.15	9.95	8.2	6.05	4.65	4.3	4.4	4.25	5.15
13	5.9	5.8	7.4	8.05	10.15	7.95	6.0	4.55	4.3	4.35	4.3	4.75
14	6.05	5.85	7.5	8.35	10.2	7.85	6.0	4.5	4.3	4.3	4.35	4.65
15	6.6	5.85	7.2	8.6	10.25	7.5	5.9	4.5	4.65	4.3	4.3	4.55
16	9.2	5.7	6.9	8.95	10.2	7.1	5.75	4.5	5.0	4.55	4.3	4.5
17	7.95	5.7	7.0	9.25	9.7	7.2	5.6	4.5	4.75	4.6	4.3	4.5
18	7.4	5.7	7.5	9.45	9.5	7.2	6.8	4.5	4.6	4.6	4.3	4.4
19	7.1	5.7	7.9	9.7	9.55	7.0	7.15	4.5	4.5	4.7	4.35	4.45
20	6.95	5.7	7.9	9.9	9.6	6.9	6.8	4.5	4.4	4.65	4.3	4.45
21	6.95	5.6	7.55	9.7	9.5	6.9	6.4	4.55	4.35	4.6	4.35	4.5
22	6.9	5.6	7.55	9.85	9.75	6.7	6.15	4.55	4.3	4.6	4.35	4.5
23	6.7	5.6	7.4	10.1	9.85	6.65	5.8	4.6	4.3	4.55	4.35	4.5
24	6.5	5.6	7.15	10.25	9.9	6.6	5.7	4.6	4.25	4.55	4.35	4.5
25	6.45	5.65	7.0	10.4	9.75	6.7	5.6	4.6	4.25	4.5	4.35	4.5
26	6.3	5.7	6.75	10.5	9.6	6.8	5.5	4.55	4.25	4.45	4.35	4.5
27	6.1	5.7	6.7	10.25	9.95	6.85	5.5	4.5	4.25	4.45	4.3	4.45
28	6.05	5.8	6.55	9.6	10.0	6.9	5.6	4.45	4.25	4.4	4.3	4.35
29	6.0	.....	6.55	9.5	10.05	6.8	5.5	4.45	4.3	4.4	4.3	4.35
30	6.05	.....	6.6	9.4	10.15	6.65	5.4	4.45	4.3	4.35	4.3	4.35
31	6.1	.....	6.7	.....	10.2	.....	5.3	4.4	.....	4.35	.....	4.35

Daily discharge, in second-feet, of Kings River near Sanger, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,700	1,750	1,550	2,530	6,370	8,740	2,080	888	348	245	322	296
2	5,510	1,550	1,860	2,770	6,150	8,070	1,970	851	348	245	322	296
3	3,730	1,500	2,080	2,960	6,720	6,830	1,800	778	348	245	296	296
4	2,900	1,550	2,300	3,300	5,720	6,260	1,600	743	375	245	296	488
5	2,410	1,550	2,470	3,880	5,010	5,820	1,360	708	348	220	296	402
6	2,140	1,450	2,590	3,510	5,110	5,110	1,270	675	348	220	296	375
7	1,860	1,410	2,650	3,370	6,370	4,540	1,360	642	322	220	296	375
8	1,700	1,310	2,770	3,960	7,560	4,110	1,500	610	322	220	296	375
9	1,650	1,270	3,030	4,720	8,070	3,960	1,600	578	296	196	270	375
10	1,650	1,270	3,030	5,210	7,680	4,110	1,600	548	296	196	270	375
11	1,550	1,270	3,030	5,110	7,940	4,540	1,600	517	296	196	270	926
12	1,450	1,270	3,100	4,280	8,200	4,360	1,600	488	296	348	270	814
13	1,450	1,360	3,160	4,110	8,740	3,960	1,550	430	296	322	296	548
14	1,600	1,410	3,300	4,630	8,880	3,800	1,550	402	296	296	322	488
15	2,190	1,410	2,900	5,110	9,020	3,300	1,450	402	488	296	296	430
16	6,370	1,270	2,530	5,820	8,880	2,770	1,310	402	708	430	296	402
17	3,960	1,270	2,650	6,480	7,560	2,900	1,180	402	548	458	296	402
18	3,160	1,270	3,300	6,950	7,070	2,900	2,410	402	458	458	296	348
19	2,770	1,270	3,880	7,560	7,190	2,650	2,840	402	402	517	322	375
20	2,590	1,270	3,880	8,070	7,310	2,530	2,410	402	348	488	296	375
21	2,590	1,180	3,370	7,560	7,070	2,530	1,970	430	322	458	322	402
22	2,530	1,180	3,370	7,940	7,680	2,300	1,700	430	296	458	322	402
23	2,300	1,180	3,160	8,610	7,940	2,240	1,360	458	296	430	322	402
24	2,080	1,180	2,840	9,020	8,070	2,190	1,270	458	270	430	322	402
25	2,020	1,220	2,650	9,450	7,680	2,300	1,180	458	270	402	322	402
26	1,860	1,270	2,360	9,750	7,310	2,410	1,090	430	270	375	322	402
27	1,650	1,270	2,300	9,020	8,200	2,470	1,090	402	270	375	296	375
28	1,600	1,360	2,140	7,310	8,340	2,530	1,180	375	270	348	296	322
29	1,550	.....	2,140	7,070	8,480	2,410	1,090	375	296	348	296	322
30	1,600	.....	2,190	6,830	8,740	2,240	1,010	375	296	322	296	322
31	1,650	.....	2,300	.....	8,880	.....	926	348	.....	322	.....	322

NOTE.—Daily discharge determined from a rating curve well defined except at the lower stages.

Monthly discharge of Kings River near Sanger, Cal., for 1910.

[Drainage area, 1,740 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,700	1,450	2,800	1.61	1.86	172,000	A.
February	1,750	1,180	1,340	.77	.80	74,400	A.
March	3,880	1,550	2,740	1.57	1.81	168,000	A.
April	9,750	2,530	5,900	3.39	3.78	351,000	A.
May	9,020	5,010	7,550	4.34	5.00	464,000	A.
June	8,740	2,190	3,830	2.20	2.45	228,000	A.
July	2,840	926	1,550	.891	1.03	95,300	A.
August	888	348	510	.293	.34	31,400	B.
September	708	270	345	.198	.22	20,500	B.
October	517	196	333	.191	.22	20,500	B.
November	322	270	301	.173	.19	17,900	B.
December	926	296	414	.238	.27	25,500	B.
The year	14,700	196	2,300	1.32	17.97	1,670,000	

DINKEY CREEK NEAR OCKENDEN, CAL.

This station was established September 17, 1910, at the Dinkey ranger station in the Sierra National Forest, in sec. 20, T. 10 S., R. 26 E., M. D. B. and M., 9½ miles southeast of Ockenden.

Rock Creek enters 3 miles above and Bear Creek 1½ miles below the gage. A small unnamed tributary joins the stream at Dinkey Meadows 100 feet above the station.

The vertical staff gage is on the right bank about 400 feet below the ranger's station.

Discharge measurements are made by wading at low and medium stages. A car and cable for making gagings at high water will be installed.

There is but one channel at all stages as both banks are high. The bed of the stream is composed of gravel and small bowlders and the current is swift. Conditions are fairly satisfactory for making accurate measurements.

This station is maintained in cooperation with the United States Forest Service.

No gage heights were observed in 1910, and no estimates of daily or monthly discharge have been prepared.

Discharge measurements of Dinkey Creek near Ockenden, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 19	J. E. Stewart	26	19	0.28	2.8
Nov. 2	H. J. Tompkins	26	22	.33	5.0

NOTE.—Measurements made by wading.

The following additional gage heights were observed by J. E. Stewart: September 20, 0.28 feet; September 21, 0.27 feet.

RUSH CREEK NEAR OCKENDEN, CAL.

Rush Creek is tributary to Big Creek, which enters Kings River in T. 12 S., R. 25 E.

This station, which is located at Peterson's sawmill, about 3 miles southeast of Ockenden, in the Sierra National Forest, was established September 22, 1910.

Taylor Creek enters 1 mile above the gage. No water is at present diverted for irrigation.

The gage is a vertical staff fastened to a large cedar tree, on the right bank, 200 feet above the wagon bridge. At high stages discharge measurements are made from the bridge; at low stages by wading above the gage.

Both banks are high and wooded and not subject to overflow. The channel is composed of sand and will shift at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rush Creek near Ockenden, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 22	J. E. Stewart	4	0.8	0.40	0.5
Nov. 1	H. J. Tompkins	4	1.3	.45	1.2

NOTE.—These measurements were made by wading near the gage. The following measurements were made of discharge in Peterson's mill flume, which diverts water from Rush Creek above the gage: Sept. 22, 0.37 second-foot; Nov. 1, 0.18 second-foot.

Daily gage height, in feet, of Rush Creek near Ockenden, Cal., for 1910.

[Carl Peterson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	0.45	0.51	11		0.98	21	0.53	0.53
2	.45	.51	12		.76	22	.53	.53
3	.45	1.55	13		.75	23	.53	.53
4		.75	14		.64	24	.52	.53
5		.52	15		.58	25	.82	.53
6		.51	16		.54	26	.96	.52
7		.49	17		.52	27	.65	.52
8		.48	18		.54	28	.58	.52
9		.47	19		.54	29	.54	.52
10		.47	20	0.54	.54	30	.51	.52
						31		.52

FRESNO RIVER BASIN.

GENERAL FEATURES.

Fresno River rises on the west slope of the Sierra Nevada, in the Sierra National Forest, near the headwaters of the South Fork of Merced River, flows in general southwestward, but its waters reach the San Joaquin only during the high-water season. At other times the excess water not used for irrigation sinks in the sand of the river channel near Madera.

The principal tributaries, all small except during the rainy season, are Lewis Fork, North Fork, China, Crooks and Coarse Gold creeks in the foothills, and Willow Creek, which joins the main river below Madera.

Near the head of the river (locally known as Redwood Creek), is a grove of big trees (*Sequoia gigantea*) known as the Nelder or Fresno grove.

Water is diverted from the headwater streams to feed the Madera Sugar Pine Lumber Co.'s flume, which is used to float lumber to Madera. Irrigation ditches take water at an altitude of about 4,500 feet, in the vicinity of Miami Mills, but only a small amount of water is used until the stream reaches the fertile valley land in the vicinity of Madera. A part of the flood waters could be stored by constructing a reservoir at Windy Gap near the mouth of Crooks Creek. The river below this point has considerable fall and power development is practicable.

FRESNO RIVER[1] NEAR FRESNO FLATS, CAL.

This station, which is located near the Salt Springs-Crane Valley highway bridge, in SE ¼ sec. 36, T. 6 S., R. 21 E., Mount Diablo base and meridian, 1½ miles above the junction with Lewis Fork, and about 4 miles northeast of Fresno Flats in the Sierra National Forest, was established September 23, 1910.

The station is below all important tributaries and above all diversions. Just above the bridge, water is diverted to a flume feeder of the Madera Sugar Pine Lumber Co.

The gage is a vertical staff fastened to an alder on the left bank about 400 feet above the bridge. Discharge measurements are made by wading.

There is but one channel at all stages as both banks are high. The bed of the stream is sandy and will shift at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

[1] Known locally as Redwood Creek.

Discharge measurements of Fresno River near Fresno Flats, Cal., in 1910.

Date.	Hydrograhper.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 23	J. E. Stewart	14	7.8	0.51	4.1
Nov. 5	H. J. Tompkins	10	7.0	.49	2.5

NOTE.—Measurements made by wading near gage.

Gage height of Fresno River near Fresno Flats, Cal., for 1910.

[Wm. M. Brown, observer.]

	Feet.		Feet.
Nov. 1	0.5	Dec. 5	0.7
7	.5	12	.7
14	.6	20	.6
21	.6	28	.5
28	.6		

NORTH FORK OF FRESNO RIVER,[1] NEAR SUGAR PINE, CAL.

This station was established September 26, 1910, at the old mill at the Miami forest ranger's camp 3 miles southwest of Sugar Pine and 35 miles northwest of Raymond.

The gage is a vertical staff fastened to an alder on the left bank about 200 feet north of the ranger's station.

Discharge measurements are made by wading.

The stream bed, which is composed of sand and small bowlders, is smooth. Both banks are high and wooded and will not overflow.

No gage heights were observed during 1910 and no estimates of daily or monthly discharge have been prepared.

This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of North Fork Fresno River near Sugar Pine, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	Stewart and Tompkins	9.5	11	0.50	3.7
Nov. 7	H. J. Tompkins	9.9	11	.50	3.5
Dec. 14	.....do	5	4.8	.55	4.7

NOTE.—All measurements were made by wading at various sections.

MERCED RIVER BASIN.

GENERAL FEATURES.

The drainage basin of Merced River lies on the western slope of the Sierra, north of the upper San Joaquin basin and south of the Tuolumne basin. It does not extend so far east as the other two basins, and it touches the Sierra divide in only one point—Mount

[1] Known locally as Miami Creek.

Lyell (elevation, 13,090 feet)—which is common to the three basins. The mountainous part of the basin lies almost wholly in Mariposa County; the foothill and valley parts are in Merced County. The basin is about 65 miles long from the rim of the valley to the crest and 20 to 25 miles wide, and its total area above the valley border is about 1,200 square miles.

Merced River has its source in numerous small glacial lakes in the region about Mount Lyell and flows southwestward to its junction with the lower San Joaquin, about 5 miles northeast of Newman. It has a total length of about 135 miles, two-thirds of which is in the mountains. Its chief tributaries are Tenaya and Yosemite creeks from the north and Illilouette and Bridal Veil creeks and South Fork from the south.

MERCED RIVER NEAR MERCED FALLS, CAL.

This station, which is located in the NW. ¼ sec. 11, T. 5 S., R. 15 E., M. D. B. and M., about 1½ miles east of Merced Falls, was established April 6, 1901.

No important tributaries enter for 25 miles above or below the station.

The water diverted for power development above the station returns to the river. Below Merced Falls, however, the combined capacity of irrigating canals in the vicinity of Snelling exceeds the low-water flow. All acquired water rights above Merced Falls are for power or mining development.

The staff gage, the datum of which has not been changed since the station was established, is in several sections on the right bank.

Discharge measurements are made from a cable near the gage.

The flow at the station is doubtless somewhat affected at times by artificial regulation at some of the power dams, several miles above, but pondage from the dam at Merced Falls probably has no appreciable effect at the station. The bed of the stream at the station is composed of gravel, and is subject to some changes at high water. The velocity is also very great at flood stages.

The 1909 rating table, which is well defined, has been used for 1910. The record is excellent.

Discharge measurements of Merced River near Merced Falls, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 4	J. E. Stewart	166	425	9.87	1,150
Apr. 2	do	202	575	10.69	2,100
May 16	do	289	983	12.56	5,340
June 30	do	146	326	9.25	658
July 16	W. V. Hardy	110	242	8.76	316
Aug. 25[a]	J. E. Stewart	59	72	8.30	149
26[a]	do	38	29	7.72	24

[a] Measurement made by wading, 200 yards above gage.

Daily gage height, in feet, of Merced River near Merced Falls, Cal., for 1910.

[C. Kelsey, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	a15.6	10.1	9.8	10.6	11.65	11.8	9.15	8.5	8.0	8.2	8.3	8.5
2	12.25	9.95	9.95	10.65	11.55	11.6	9.1	8.5	7.9	8.2	8.3	8.5
3	11.3	9.9	10.05	10.65	11.7	11.1	9.1	8.45	7.95	8.2	8.35	8.5
4	10.7	9.8	10.2	10.8	11.3	10.85	9.0	8.4	7.95	8.15	8.3	8.55
5	10.4	9.8	10.25	11.0	10.95	10.7	8.9	8.4	7.95	8.0	8.1	8.7
6	10.25	9.7	10.25	11.0	11.1	10.6	8.8	8.35	8.1	8.0	8.25	8.65
7	10.15	9.75	10.35	10.9	11.8	10.4	8.8	8.35	7.7	8.15	8.2	8.6
8	10.0	9.85	10.35	11.2	12.25	10.3	8.8	8.35	7.9	7.95	8.45	8.65
9	9.95	9.7	10.45	11.6	12.3	10.2	8.9	8.3	7.95	7.95	8.35	8.7
10	9.9	9.7	10.45	11.75	12.3	10.2	8.95	8.4	7.7	7.95	8.2	8.75
11	9.8	9.65	10.45	11.65	12.2	10.25	8.9	8.35	7.7	8.0	8.45	8.85
12	9.75	9.65	10.5	11.25	12.05	10.3	8.9	8.3	7.95	8.05	8.45	9.4
13	9.65	9.65	10.55	11.0	12.3	10.15	8.9	8.2	7.95	8.7	8.45	9.05
14	9.95	9.7	10.55	11.45	12.25	10.05	8.8	8.3	7.95	8.7	8.45	8.9
15	10.6	9.7	10.45	11.75	12.4	9.95	8.8	8.3	7.95	8.6	8.45	8.8
16	12.25	9.6	10.25	12.0	12.45	9.75	8.8	8.25	10.15	8.6	8.45	8.7
17	11.45	9.55	10.2	12.3	12.0	9.75	8.8	8.25	9.65	8.6	8.45	8.7
18	10.75	9.55	10.45	12.5	11.85	9.75	8.8	8.25	9.05	8.6	8.4	8.6
19	10.45	9.8	11.05	12.6	11.7	9.65	9.2	8.25	8.85	8.65	8.45	8.65
20	10.2	9.85	11.15	12.7	11.95	9.55	9.25	8.3	8.6	8.6	8.5	8.65
21	10.1	9.7	10.85	12.4	11.9	9.5	9.1	8.2	8.5	8.6	8.45	8.6
22	10.15	9.65	11.2	12.6	12.05	9.4	8.85	8.05	8.4	8.6	8.5	8.6
23	10.35	9.7	12.2	12.7	12.0	9.35	8.8	8.05	8.35	8.5	8.45	8.5
24	10.75	9.65	11.4	12.8	12.15	9.3	8.8	8.05	8.3	8.5	8.5	8.55
25	10.85	9.7	10.95	12.7	11.95	9.3	8.75	8.05	8.25	8.4	8.65	8.55
26	10.6	9.7	10.85	12.9	11.75	9.3	8.65	8.05	8.25	8.4	8.6	8.55
27	10.5	9.65	10.55	12.65	11.85	9.4	8.6	8.05	8.3	8.35	8.55	8.55
28	10.4	9.7	10.45	12.5	11.85	9.4	8.6	8.05	8.25	8.3	8.5	8.5
29	10.3	.....	10.4	12.2	11.8	9.3	8.65	8.1	8.25	8.35	8.5	8.45
30	10.2	.....	10.4	11.85	11.9	9.2	8.6	8.05	8.25	8.3	8.5	8.45
31	10.1	.....	10.45	.....	11.85	.....	8.55	7.95	.....	8.3	.....	8.5

a Maximum 16.7 feet.

Daily discharge, in second-feet, of Merced River near Merced Falls, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	14,600	1,320	1,040	1,930	3,590	3,860	555	220	70	115	145	220
2	4,710	1,170	1,170	2,000	3,420	3,500	525	220	51	115	145	220
3	2,990	1,120	1,270	2,000	3,680	2,670	525	200	60	115	162	220
4	2,070	1,040	1,430	2,210	2,990	2,280	465	180	60	102	145	240
5	1,670	1,040	1,490	2,510	2,440	2,070	410	180	60	70	90	305
6	1,490	945	1,490	2,510	2,670	1,930	355	162	90	70	130	282
7	1,380	990	1,610	2,360	3,680	1,670	355	162	23	102	115	260
8	1,220	1,080	1,610	2,830	4,710	1,550	355	162	51	60	200	282
9	1,170	945	1,740	3,500	4,810	1,430	410	145	60	60	162	305
10	1,120	945	1,740	3,770	4,810	1,430	438	180	23	60	115	330
11	1,040	905	1,740	3,590	4,610	1,490	410	162	23	70	200	362
12	990	905	1,800	2,910	4,320	1,550	410	145	60	80	200	720
13	905	905	1,860	2,510	4,810	1,380	410	115	60	305	200	495
14	1,170	945	1,860	3,240	4,710	1,270	355	145	60	305	200	410
15	1,930	945	1,740	3,770	5,020	1,170	355	145	60	260	200	355
16	4,710	865	1,490	4,220	5,130	990	355	130	1,380	260	200	305
17	3,240	828	1,430	4,810	4,220	990	355	130	905	260	200	305
18	2,140	828	1,740	5,240	3,950	990	355	130	495	260	180	260
19	1,740	1,040	2,590	5,470	3,680	905	585	130	382	282	200	282
20	1,430	1,080	2,750	5,700	4,130	828	618	145	260	260	220	282
21	1,320	945	2,280	5,020	4,040	790	525	115	220	260	200	260
22	1,380	905	2,830	5,470	4,320	720	384	80	180	260	220	260
23	1,610	945	4,610	5,700	4,220	685	355	80	162	220	200	220
24	2,140	905	3,160	5,940	4,510	650	355	80	145	220	220	240
25	2,280	945	2,440	5,700	4,130	650	330	80	130	180	282	240
26	1,930	945	2,280	5,940	3,770	650	282	80	130	180	260	240
27	1,800	905	1,860	5,580	3,950	720	260	80	145	162	240	240
28	1,670	945	1,740	5,240	3,950	720	260	80	130	145	220	220
29	1,550	.....	1,670	4,610	3,860	650	282	90	130	162	220	200
30	1,430	.....	1,670	3,950	4,040	585	260	80	130	145	220	200
31	1,320	.....	1,740	.....	3,950	.....	240	60	.....	145	.....	220

NOTE.—Daily discharge determined from a rating curve well defined below a discharge of 2,500 second-feet and fairly well defined above.

Monthly discharge of Merced River near Merced Falls, Cal., for 1910.

[Drainage area, 1,090 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,600	905	2,260	2.07	2.39	139,000	B.
February	1,320	828	974	.894	.93	54,100	A.
March	4,610	1,040	1,930	1.77	2.04	119,000	A.
April	5,940	1,930	4,010	3.68	4.11	239,000	A.
May	5,130	2,440	4,070	3.73	4.30	250,000	A.
June	3,860	585	1,360	1.25	1.40	80,900	A.
July	618	240	391	.359	.41	24,000	A.
August	220	60	132	.121	.14	8,120	A.
September	1,380	23	191	.175	.20	11,400	A.
October	305	60	171	.157	.18	10,500	A.
November	282	90	190	.174	.19	11,300	A.
December	720	200	290	.266	.31	17,800	A.
The year	14,600	23	1,330	1.22	16.60	965,000	

SOUTH FORK OF MERCED RIVER AT WAWONA, CAL.

This station was established December 15, 1910, at the upper foot bridge, opposite the United States military camp 1 mile below Wawona, in the SE. ¼ sec. 33, T. 4 S., R. 21 E., M. D. B. and M., in the Sierra National Forest.

Big Creek enters one-fourth mile above and Rush Creek three-fourths mile below the station. The ranch of the Wawona Co. at Wawona is irrigated from a tributary of the South Fork.

The gage is a vertical staff fastened to the center pier of the foot-bridge. At low and medium stages discharge measurements are made by wading below the bridge; a car and cable will be installed for high-stage measurements.

The channel, which is composed of gravel and small boulders, is straight for some distance above and below the station. The left bank is high; the right bank is more sloping. There is but one channel at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Merced River at Wawona, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Sept. 24	J. E. Stewart	9.8	7.4	(a)	26
Dec. 15	H. J. Tompkins	35	39	2.00	38

a No gage installed.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Merced River at Wawona; Cal., for 1910.

[A. C. Leonard, observer.]

	Feet.		Feet.
Dec. 15	2.0	Dec. 24	2.0
16	2.0	25	...
17	2.1	26	...
18	1.7	27	1.8
19	1.7	28	1.6
20	2.1	29	1.6
21	2.1	30	1.6
22	2.1	31	1.6
23	1.9		

BIG CREEK NEAR WAWONA, CAL.

This station, which is located at the highway bridge on the old Madera-Yosemite toll road at Summerdale (an abandoned post office), in sec. 23, T. 5 S., R. 21 E., 4 miles south of Wawona, was established September 25, 1910.

Several miles above the station water is diverted from Rush Creek, the principal tributary of Big Creek, for use in the flume of the Madera Sugar Pine Co. for floating lumber from Sugar Pine to Madera.

The gage is a vertical staff fastened to the downstream end of the left abutment of the bridge.

At high stages discharge measurements are made from the bridge.

No gage heights were observed during 1910 and no estimates of daily or monthly discharge have been prepared.

This station is maintained in cooperation with the United States Forest Service.

Discharge measurements of Big Creek near Wawona, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 25	Stewart and Roberts	10.5	4.8	0.17	2.9
Nov. 7	H. J. Tompkins	10.0	5.0	.20	4.5

NOTE.—Measurements made by wading.

TUOLUMNE RIVER BASIN.

GENERAL FEATURES.

Tuolumne River drains an area on the western slope of the Sierra, north of the Merced basin and south of the Stanislaus basin. For a distance of about 50 miles the Sierra divide separates this basin from Mono Lake and Walker River basins to the east. The length of the basin is about 105 miles, two-thirds of which is in the mountains. The total area of the mountainous part of the drainage basin is about 1,680 square miles—almost wholly in Tuolumne County.

A. TUOLUMNE RIVER NEAR MOUTH OF CONNESS CREEK.

B. FALLS OF RANCHERIA CREEK, HETCH HETCHY VALLEY.

The Tuolumne rises in numerous glacial lakes on or near the Sierra divide, and flows southwestward to its junction with the San Joaquin, 10 miles west of Modesto. Its principal headwaters come from the glacier and lakes on the northern slope of Mount Lyell to the north and east of the headwaters of Merced River. The course of the river is through beautiful upland meadows in its upper part, then through a canyon nearly 80 miles long, which has been cut out of solid granite. The upper part of this canyon, for a distance of about 25 miles, is from 3,000 to 4,000 feet deep, and is known as the Grand Canyon of the Tuolumne. At the lower end of the Grand Canyon is Hetch Hetchy Valley, which is smaller than Yosemite Valley, but in every other way resembles it very much. (See Pl. III.) Finally, the river passes through the lower canyon into the San Joaquin Valley, which it enters near Lagrange. Its total length is about 150 miles.

Nearly all the tributaries of Tuolumne River enter from the north. In order from east to west, the principal ones are Return, Rancheria, Falls, and Cherry creeks, Clavey River, North Fork of Tuolumne River, and Woods Creek. Eleanor Creek is tributary to Cherry Creek. South Fork of Tuolumne River is tributary to the main stream from the south. Middle Fork is tributary to South Fork.

TUOLUMNE RIVER NEAR LAGRANGE, CAL.

This station was established August 29, 1895, at the wagon bridge at Lagrange, about 2 miles below the Lagrange dam and headworks of Turlock and Modesto canals, and half a mile below the power house of the Lagrange Water & Power Co. in NW. ¼ sec. 20, T. 3 S., R. 14 E., M. D. M. Since April 1, 1908, the station has been maintained at the dam in SE. ¼ sec. 17 T. 3 S., R. 14 E., M. D. M., and flow has been determined by considering the dam as a weir.

Woods Creek unites with the main stream from the north about 20 miles above Lagrange. No other tributaries of importance enter near the station.

Three important diversion systems take water from Tuolumne River above Lagrange: The Turlock and Modesto canals take water at Lagrange dam from the left and right banks, respectively, for irrigation in the San Joaquin Valley. The Lagrange Water & Power Co.'s canal takes water from the left bank about 17 miles above Lagrange. The diverted water is used chiefly for power development and all water so used is returned to the river below the dam. Water rights already acquired on this stream are considerably in excess of the low-water flow. It is practically impossible to determine the minimum flow of the stream very closely because of the diversions. During the late summer and fall the power and irrigation canals take the total flow and no water passes over the dam for several months at a time. Regular stations are maintained on

the three canals, but the minimum flow is appreciably affected by water that seeps around and through the dam and from the canals.

The gage is painted on a rock ledge on the right bank, 80 feet above the dam. The zero of the gage is at the average elevation of the crest of the dam. The gage at the original station is a vertical staff on the pier of the bridge from which occasional discharge measurements are made for checking the rating of the dam. The original datum of this gage is still maintained.

In general, conditions for obtaining accurate discharge data at Lagrange dam are very good, and, except for minimum flow, full reliance can be placed on the records at this station.

Discharge measurements of Tuolumne River at Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Apr. 1	J. E. Stewart	260	1,180	4.48	3,450
May 19	do	314	1,630	5.88	6,400
June 28	do	188	657	2.29	335

NOTE.—All measurements made at highway bridge at Lagrange.

Discharge measurements of Tuolumne River at Lagrange dam, near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec. ft.*
Apr. 1	J. E. Stewart			2.40	3,380
May 19	do			3.65	6,320
June 28	do			.51	300

NOTE.—To obtain the discharge over Lagrange dam as given in this table, from the discharge of the river at the highway bridge at Lagrange have been subtracted the flow of Lagrange Water & Power Co.'s canal and return waters entering the river between the bridge and the dam. These have been allowed for as follows:

		Sec. ft.
Apr. 1.	Lagrange Water & Power Co.'s canal	40
	Waste water from Modesto and Turlock canals	25
May 19.	Lagrange Water & Power Co.'s canal	26
	Waste water from Turlock canal	53
	Water in creek under Morgan flume	5
June 28.	Lagrange Water & Power Co.'s canal	30
	Waste water from Modesto and Turlock canals	4
	Water in creek under Morgan flume	1

Daily gage height, in feet, of Tuolumne River near Lagrange, Cal., for 1910.

[J. W. Simmons, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.0	2.0	1.7	2.55	2.65	4.55	0.05	.....	.....	.....	0.3	0.5
2	3.4	1.7	1.9	2.55	2.3	4.3	.....	.....	.....	.....	.3	.6
3	2.6	1.8	2.0	2.5	2.8	3.6	.....	.....	.....	.....	.....	.5
4	2.4	1.6	2.35	2.5	2.7	3.15	.....	.....	.....	.....	.3	.....
5	.....	1.5	2.3	2.35	2.05	2.6	.....	.....	.....	.....	.....	.85
6	2.9	1.5	2.75	2.7	2.15	2.7	.....	.....	.....	.....	.3	.....
7	1.9	1.5	2.25	2.6	2.9	2.45	.....	.....	.....	.....	.....	.....
8	1.8	1.5	2.1	2.9	3.7	2.25	.....	.....	.....	0.8	.....	.95
9	1.7	1.4	2.3	3.1	4.35	2.2	.....	.....	.....	.....	.3	.....
10	1.7	1.15	2.2	3.4	4.4	2.25	.....	.....	.....	.....	.....	.....

Daily gage height, in feet, of Tuolumne River near Lagrange, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	1.6	1.2	2.2	3.35	4.45	2.4	.....	.....	.....	.....	.....	1.4
12	.....	1.4	2.2	2.8	3.9	2.45	.....	.....	.....	.....	0.3	1.4
13	1.45	1.5	2.25	2.75	4.3	2.15	.....	.....	.....	0.6	.....	.....
14	1.9	1.5	2.3	2.95	4.3	2.05	.....	.....	.....	.45	.....	1.0
15	1.8	1.4	2.0	3.1	4.3	1.85	.....	.....	.....	.35	.....	.75
16	2.8	1.15	1.8	3.45	4.35	1.65	.....	.....	1.30	.25	.....	.....
17	2.3	1.05	1.7	3.8	3.7	1.7	.....	.....	.8	.....	.....	.....
18	2.0	1.0	2.3	4.1	3.65	1.65	.....	.....	.25	.6	.....	.6
19	1.8	1.3	3.8	4.3	3.7	1.5	.....	.....	.....	.....	.....	.6
20	1.6	1.35	2.6	4.5	3.8	1.4	.....	.....	.....	.5	.55	.6
21	1.6	1.1	2.55	3.95	3.8	1.3	.....	.....	.....	.5	.55	.....
22	1.7	1.25	2.55	4.05	4.3	1.15	.....	.....	.....	.....	.....	.....
23	2.2	1.2	2.1	4.2	4.5	1.0	.....	.....	.....	.....	.....	.....
24	3.0	1.15	2.05	4.45	4.5	.8	.....	.....	.....	.4	.7	.....
25	2.0	1.1	2.0	4.5	4.3	.6	.....	.....	.....	.....	.....	.5
26	2.4	1.3	2.0	4.7	4.0	.7	.....	.....	.....	.35	.....	.....
27	2.4	1.25	2.05	4.7	4.15	.7	.....	.....	.....	.....	.65	.4
28	2.1	1.6	2.15	4.95	4.2	.65	.....	.....	.....	.3	.....	.....
29	2.0	.....	2.35	3.95	4.2	.45	.....	.....	.....	.....	.....	.....
30	2.0	.....	2.6	3.15	4.35	.2	.....	.....	.....	.3	.....	.....
31	1.9	.....	2.35	.....	4.6	.....	.....	.....	.....	.....	.....	.....

Daily discharge, in second-feet, of Tuolumne River near Lagrange, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13,300	2,560	2,000	3,690	3,910	8,780	.....	.....	.....	.....	149	320
2	5,670	2,000	2,370	3,690	3,160	8,080	.....	.....	.....	.....	149	421
3	3,800	2,180	2,560	3,580	4,240	6,180	.....	.....	.....	.....	149	320
4	3,370	1,830	3,260	3,580	4,020	5,060	.....	.....	.....	.....	149	515
5	3,920	1,660	3,160	3,260	2,660	3,800	.....	.....	.....	.....	149	710
6	4,470	1,660	4,130	4,020	2,850	4,020	.....	.....	.....	.....	149	753
7	2,370	1,660	3,060	3,800	4,470	3,480	.....	.....	.....	.....	149	795
8	2,180	1,660	2,750	4,470	6,440	3,060	.....	.....	.....	648	149	838
9	2,000	1,500	3,160	4,940	8,220	2,950	.....	.....	.....	.....	149	1,060
10	2,000	1,110	2,950	5,670	8,360	3,060	.....	.....	.....	.....	149	1,280
11	1,830	1,180	2,950	5,540	8,500	3,370	.....	.....	.....	.....	149	1,500
12	1,700	1,500	2,950	4,240	6,970	3,480	.....	.....	.....	.....	149	1,500
13	1,580	1,660	3,060	4,730	8,080	2,850	.....	.....	.....	421	177	1,200
14	2,370	1,660	3,160	4,580	8,080	2,660	.....	.....	.....	274	205	905
15	2,180	1,500	2,560	4,940	8,080	2,280	.....	.....	.....	189	233	589
16	4,240	1,110	2,180	5,800	8,220	1,920	.....	.....	1,340	115	261	533
17	3,160	972	2,000	6,700	6,440	2,000	.....	.....	648	268	289	477
18	2,560	905	3,160	7,520	6,310	1,920	.....	.....	115	421	316	421
19	2,180	1,340	6,700	8,080	6,440	1,660	.....	.....	.....	370	343	421
20	1,830	1,420	3,800	8,640	6,700	1,500	.....	.....	.....	320	370	421
21	1,830	1,040	3,690	7,100	6,700	1,340	.....	.....	.....	320	370	400
22	2,000	1,260	3,690	7,380	8,080	1,110	.....	.....	.....	290	423	380
23	2,950	1,180	2,750	7,800	8,640	905	.....	.....	.....	259	477	360
24	4,700	1,110	2,660	8,500	8,640	648	.....	.....	.....	229	530	340
25	2,560	1,040	2,560	8,640	8,080	421	.....	.....	.....	209	512	320
26	3,370	1,340	2,560	9,220	7,240	530	.....	.....	.....	189	494	274
27	3,370	1,260	2,660	9,220	7,660	530	.....	.....	.....	169	476	229
28	2,750	1,830	2,850	9,960	7,800	476	.....	.....	.....	149	437	229
29	2,560	.....	3,260	7,100	7,800	274	.....	.....	.....	149	398	229
30	2,560	.....	3,800	5,060	8,220	81	.....	.....	.....	149	359	229
31	2,370	.....	3,260	.....	8,930	.....	.....	.....	.....	149	.....	229

NOTE.—The flow was all in the canals July 1 to Sept. 15, Sept. 19 to Oct. 7, and Oct. 9 to 12. Daily discharge interpolated for days of missing gage heights during January and after Oct. 12. Other determinations of discharge made from a fairly well-developed rating curve. The upper part of the curve has been defined by the weir formula, $Q = 905\ h^{\frac{3}{2}}$.

Monthly discharge of Tuolumne River near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	13,300	1,580	3,150	194,000	A.
February	2,560	905	1,470	81,600	A.
March	6,700	2,000	3,090	190,000	A.
April	9,960	3,260	6,030	359,000	A.
May	8,930	2,660	6,770	416,000	A.
June	8,780	81	2,610	155,000	A.
July	0	0	0	0	
August	0	0	0	0	
September	1,340	0	70.1	4,170	B.
October	648	0	171	10,500	B.
November	530	149	282	16,800	B.
December	1,500	229	587	36,100	B.
The year	13,300	0	2,020	1,460,000	

NOTE.—Flow over the dam only.

MODESTO CANAL NEAR LAGRANGE, CAL.

The Modesto canal, which diverts water from the right bank of Tuolumne River, is owned by the Modesto irrigation district. The water is taken through a concrete bulkhead at the end of Lagrange dam and is used for irrigating 81,200 acres of land around Modesto in Stanislaus County. The district has filed on 640 second-feet, but the maximum capacity of the canal at present is less than 600 second-feet.

The principal part of the construction work on this canal was done prior to 1892, but on account of litigation the canal was not finished until April, 1903. A gage-height record has been kept since April 26, 1903, when a gage was installed in Indian Hill flume, near Lagrange, Cal. On July 12, 1904, the station was moved to the flume near the intake, in SE. ¼ sec. 17, T. 3 S., R. 14 E., M. D. M., in order that more gage readings could be made and their fluctuations better interpreted. The gage is an iron staff in a concrete well about 50 feet below the waste gates. Measurements are made from a footbridge at a concrete section about 500 feet below the headworks.

This station is well rated and the record is excellent.

Discharge measurements of Modesto canal near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 18	J. E. Stewart	22.1	89.3	3.38	570
18	.....do	21.9	84.7	3.22	538
18	.....do	21.7	69	2.60	414
18	.....do	21.3	54.1	2.00	298
18	.....do	20.9	40	1.50	192
18	.....do	20.7	26.3	.99	100

Daily gage height, in feet, of Modesto canal near Lagrange, Cal., for 1910.

[J. W. Simmons, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	.....	2.75	.....	3.12	3.22	3.35	1.0	0.35	.....
2	.....	2.7	.....	3.11	3.2	3.15	1.0	.35	.....
3	1.0	1.9	.....	3.25	3.22	2.9	1.0	.....	.....
4	1.45	.....	.....	3.18	3.22	2.55	.9	.2	.....
5	1.75	2.15	1.0	3.18	3.24	2.45	.8	.25	.....
6	1.75	.7	1.25	3.2	3.24	1.8	.7	.1	.....
7	1.75	.....	1.6	3.19	3.22	1.85	.7	.2	.....
8	2.0	2.3	2.0	3.2	3.21	1.9	.65	.35	0.8
9	2.0	1.3	2.6	3.11	3.22	1.95	.65	.....	.8
10	2.0	2.75	2.6	3.2	3.2	2.0	.3	.....	.65
11	1.85	2.75	2.6	3.2	3.23	1.95	.....	.....	.8
12	.....	2.75	2.55	3.2	3.22	1.95	.5	.....	.9
13	.....	2.75	2.6	3.2	3.21	1.8	.5	.1	1.4
14	.....	2.75	2.6	3.2	3.23	1.7	.5	.1	1.5
15	2.0	2.75	2.62	3.2	3.24	1.6	.45	.15	1.6
16	2.3	2.75	2.66	3.2	3.3	1.55	.45	.75	1.6
17	2.45	2.75	2.7	3.2	3.3	1.45	.4	.75	.....
18	2.6	2.9	2.75	3.28	3.31	1.4	.4	1.05	.....
19	2.65	2.9	2.95	3.22	3.3	2.15	.4	1.5	.....
20	2.65	.....	2.98	3.2	3.32	2.2	.4	1.2	.....
21	2.7	3.2	3.02	3.2	3.31	2.3	.4	.9	.....
22	2.65	3.2	2.98	3.18	3.31	1.8	.6	.75	.....
23	2.6	.....	3.10	3.22	3.31	1.6	.5	.7	.....
24	2.6	2.9	3.05	3.22	3.3	1.45	.45	.65	.....
25	2.6	2.5	3.15	3.2	3.31	1.35	.4	.5	.....
26	2.7	2.2	2.98	3.21	3.31	1.25	.45	.45	.....
27	2.7	1.5	3.00	3.23	3.31	1.2	.45	.45	.....
28	1.35	.....	3.05	3.21	3.3	1.2	.45	.45	.....
29	.....	.....	3.15	3.22	3.31	1.15	.45	.....	.....
30	.....	.....	3.12	3.2	3.34	1.1	.45	.....	.....
31	.....	.....	.....	3.22	.....	1.05	.45	.....	.....

Daily discharge, in second-feet, of Modesto canal near Lagrange, Cal., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
1	0	444	0	518	538	564	100	18	0
2	0	434	0	516	534	524	100	18	0
3	100	274	0	544	538	474	100	0	0
4	184	0	0	530	538	404	84	7	0
5	244	324	100	530	542	384	69	10	0
6	244	55	146	534	542	254	55	2	0
7	244	0	214	532	538	264	55	7	0
8	294	354	294	534	536	274	49	18	69
9	294	155	414	516	538	284	49	14	69
10	294	444	414	534	534	294	14	11	49
11	264	444	414	534	540	284	0	8	69
12	0	444	404	534	538	284	32	5	84
13	0	444	414	534	536	254	32	2	174
14	0	444	414	534	540	234	32	2	194
15	294	444	418	534	542	214	27	4.5	214
16	354	444	426	534	554	204	27	62	214
17	384	444	434	534	554	184	22	62	0
18	414	474	444	550	556	170	22	108	0
19	424	474	484	538	554	324	22	194	0
20	424	544	490	534	558	334	22	136	0
21	434	534	498	534	556	354	22	84	0
22	424	534	490	530	556	254	43	62	0
23	414	584	514	538	556	214	32	55	0
24	414	474	504	538	554	184	27	49	0
25	414	394	524	534	556	164	22	32	0
26	434	334	490	536	556	146	27	27	0
27	434	194	494	540	556	136	27	27	0
28	164	0	504	536	554	136	27	27	0
29	.....	0	524	538	556	126	27	0	0
30	.....	0	518	534	562	117	27	0	0
31	.....	0	.....	538	.....	108	27	.....	0

NOTE.—No flow in the canal during 1910 on days for which no gage height is given, except Mar. 20 and 23, when gage heights were observed incorrectly, and Sept. 9 to 12. Daily discharge for those days estimated. Other determinations of daily discharges obtained from a rating curve well defined above 10 second-feet.

Monthly discharge of Modesto Canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	0	0	0	0	
February	434	0	271	15,100	A.
March	[a] 584	0	327	20,100	A.
April	524	0	366	21,800	A.
May	550	516	534	32,800	A.
June	562	534	547	32,500	A.
July	564	108	263	16,200	A.
August	100	0	39.4	2,420	A.
September	194	0	35.0	2,080	B.
October	214	0	36.6	2,250	C.
November	0	0	.0	0	
December	0	0	.0	0	
The year	584	0	201	145,000	

[a] Estimated.

TURLOCK CANAL NEAR LAGRANGE, CAL.

The Turlock canal, which is owned by the Turlock irrigation district, diverts water through a short tunnel from the left bank of Tuolumne River. The head gates are only a few feet above Lagrange dam. The diverted water is used for irrigating 176,000 acres of fertile land in the vicinity of Turlock and Ceres in Stanislaus County. The district has filed on 1,500 second-feet, but the maximum capacity of the canal at present is somewhat less than 1,000 second-feet.

The first water was turned into the canal in small quantities in 1898 and was used for puddling. A record of the gage height has been kept from July, 1899, to the present time. The gage is a staff float in a concrete well a few feet below the waste gates. The gage is located at the head of the canal of the Turlock irrigation district, in the SW. ¼ sec. 16, T. 3 S., R. 14 E., M. D. B. and M. Measurements are made in a board flume about half a mile below the gage well.

The 1910 rating curve is well defined and the record is excellent.

Discharge measurements of Turlock canal near Lagrange, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Apr. 1	J. E. Stewart	23.8	112	4.00	535
June 28	do	23.8	155	5.48	811
28	do	23.8	160	5.62	862
June 29	do	23.8	77.6	2.48	271
29	do	23.8	108	3.65	473
29	do	23.8	130	4.54	631

ily gage height, in feet, of Turlock canal near Lagrange, Cal., for 1910.

[H. T. Sackett, observer.]

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
.....	.....	2.4	4.0	5.5	.....	5.45	2.25	0.35	1.05
.....	.....	2.4	4.0	5.5	.....	5.3	2.1	.35	.....
.....	.....	2.45	4.0	5.5	.....	5.15	2.0	.3	.....
.....	.....	3.05	4.0	.3	.....	4.95	1.85	.15	.....
.....	.....	3.05	4.0	3.8	.....	4.6	1.8	.2	.....
.....	.....	3.5	4.0	5.45	.....	4.25	1.65	.2	.....
.....	.....	3.5	4.0	5.55	.....	4.1	1.55	.2	.....
.....	.....	3.5	4.0	5.6	.....	4.1	1.45	.2	.....
.....	1.4	3.5	4.05	5.6	.....	4.45	1.35	.2	.....
.....	1.45	3.5	4.0	.....	.....	4.4	1.35	.2	.....
.....	1.7	3.45	4.0	.....	.....	4.4	1.35	.2	.....
.....	1.75	3.5	3.95	.....	.....	4.35	1.15	.2	.....
.....	1.75	3.5	4.0	.....	.....	4.05	1.1	.2	.....
.....	1.8	3.5	4.05	.....	.....	3.75	1.05	.15	.....
.....	1.95	4.0	4.0	.....	.....	3.55	1.0	.15	.....
.....	2.25	4.0	4.0	.....	.....	3.45	.95	2.5	.....
.....	2.4	4.0	4.05	.....	.....	3.3	.9	4.0	.....
.....	2.4	4.05	4.05	.....	.....	3.15	.75	4.0	.....
.....	2.4	4.05	4.0	.....	.....	4.8	.7	3.95	.....
.....	2.4	4.0	4.5	.....	.....	4.85	.7	2.6	.....
.....	2.4	3.85	4.5	.....	.....	5.4	.7	2.2	.....
.....	2.4	3.0	4.5	.....	1.0	4.3	.5	1.85	.....
.....	2.4	4.0	4.5	.....	2.0	3.75	.5	1.6	.....
.....	2.4	4.0	5.0	.....	3.0	3.4	.5	1.35	.....
.....	2.4	3.95	5.0	.....	4.7	3.1	.5	1.15	.....
.....	2.4	4.0	5.05	.....	5.05	2.8	.5	1.05	.....
.....	2.4	4.0	5.0	.....	5.3	2.7	.5	1.0	.....
.....	2.4	4.0	5.05	.....	5.5	2.6	.55	.8	.....
.....	.....	2.8	4.9	.....	5.6	2.6	.45	1.2	.....
.....	.....	4.0	5.0	.....	5.5	2.6	.45	1.35	.....
.....	.....	4.0	.....	.....	.....	2.45	.45	.....	.....

discharge, in second-feet, of Turlock canal near Lagrange, Cal., for 1910.

Day.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.
.....	0	260	533	827	0	817	238	26	90
.....	0	260	533	827	0	787	216	26	0
.....	0	268	533	827	0	757	202	22	0
.....	0	364	533	22	0	717	183	10	0
.....	0	364	533	496	0	647	177	14	0
.....	0	442	533	817	0	580	159	14	0
.....	0	442	533	837	0	552	147	14	0
.....	0	442	533	847	0	552	135	14	0
.....	129	442	542	847	0	618	123	14	0
.....	135	442	533	0	0	609	123	14	0
.....	165	433	533	0	0	609	123	14	0
.....	171	442	524	0	0	600	100	14	0
.....	171	442	533	0	0	542	95	14	0
.....	177	442	542	0	0	487	90	10	0
.....	196	533	533	0	0	451	85	10	0
.....	238	533	533	0	0	433	80	275	0
.....	260	533	542	0	0	407	75	533	0
.....	260	542	542	0	0	382	62	533	0
.....	260	542	533	0	0	687	57	524	0
.....	260	533	628	0	0	697	57	290	0
.....	260	505	628	0	0	807	57	230	0
.....	260	356	628	0	85	590	39	183	0
.....	260	533	628	0	202	487	39	153	0
.....	260	533	727	0	356	424	39	123	0
.....	260	524	727	0	667	373	39	100	0
.....	260	533	737	0	737	322	39	90	0
.....	260	533	727	0	787	306	39	85	0
.....	260	533	737	0	827	290	44	66	0
.....	.....	322	707	0	847	290	34	106	0
.....	.....	533	727	0	827	290	34	123	0
.....	.....	533	.....	0	.....	268	34	.....	0

flow in the canal Jan. 1 to Feb. 8, May 10 to June 21, and Oct. 2 to Dec. 31. Water turned of leak in canal May 10 to June 21. Daily discharge determined from a rating curve well een 250 and 850 second-feet.

Monthly discharge of Turlock canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	0	0	0	0	
February	260	0	161	8,940	A.
March	542	260	456	28,000	A.
April	737	524	592	35,200	A.
May	847	0	205	12,600	B.
June	847	0	178	10,600	B.
July	817	268	528	32,500	A.
August	238	34	95.6	5,880	B.
September	533	10	121	7,200	B.
October	90	0	2.9	178	
November	0	0	.0	0	
December	0	0	.0	0	
The year	847	0	195	141,000	

Monthly discharge of Tuolumne River, Turlock canal, and Modesto canal, near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).
	Maximum.	Minimum.	Mean.	
January	13,300	1,580	3,150	194,000
February	2,560	1,580	1,900	106,000
March	7,720	2,700	3,870	238,000
April	11,200	3,800	6,990	416,000
May	9,470	3,690	7,510	462,000
June	9,320	1,470	3,340	199,000
July	1,380	376	791	48,600
August	338	61	135	8,300
September	1,680	12	226	13,400
October	717	0	210	12,900
November	530	149	282	16,800
December	1,500	229	587	36,100
The year	13,300	0	2,420	1,750,000

NOTE.—These estimates represent the combined flow of Tuolumne River at Lagrange Dam, Turlock Canal, and Modesto Canal, but do not include the flow in the power canal.

LAGRANGE WATER & POWER CO.'S CANAL NEAR LAGRANGE, CAL.

The Lagrange Water & Power Co.'s canal takes water from the south side of Tuolumne River at Indian Bar, about 17 miles above the town of Lagrange. This canal was built in the early days to supply water for hydraulic mining in the vicinity of Lagrange, and it is now locally known as the "old mining ditch." Recently it has been thoroughly repaired and is now used as a supply canal for the new hydro-electric plant which was installed in the latter part of 1907. The power house is situated on the bank of the river about half a mile above the town of Lagrange and is below the dam and headworks of the Turlock and Modesto irrigation canals. Gage heights are depths of water in the flume.

No discharge measurements were made in 1910.

Daily gage height, in feet, and discharge, in second-feet, of Lagrange Water & Power Co.'s canal near Lagrange, Cal., for 1910.

[H. T. Sackett, observer.]

Day.	April.		May.		June.		July.		August.		September.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharg.
1	.....	.....	2.60	61.0	.....	.....	.....	.....	2.65	62.8	2.60	61.0
2	.....	.....	2.60	61.0	.....	.....	.....	.....	2.65	62.8	2.60	61.0
3	.....	.....	2.60	61.0	.....	.....	.....	.....	2.60	61.0	.....	.0
4	.....	.....	2.45	55.8	.....	.....	.....	.....	2.60	61.0	2.65	62.8
5	.....	.....	2.60	61.0	.....	.....	.....	.....	2.63	62.0	2.60	61.0
6	.....	.....	2.60	61.0	.....	.....	.....	.....	2.60	61.0	2.60	61.0
7	.....	.....	2.60	61.0	.....	.....	.....	.....	2.55	59.2	2.55	59.2
8	.....	.....	2.25	48.8	.....	.....	.....	.....	2.55	59.2	2.55	59.2
9	.....	.....	2.25	48.8	.....	.....	.....	.....	2.60	61.0	2.55	59.2
10	.....	.....	.....	.....	.....	.....	.....	.....	2.62	61.7	2.55	59.2
11	.....	.....	.....	.....	.....	.....	.....	.....	2.63	62.0	2.58	60.3
12	2.40	54.0	.....	.....	.....	.....	2.7	64.5	2.60	61.0	.....	.....
13	.....	.0	.....	.....	.....	.....	.....	.0	2.60	61.0	.....	.....
14	2.40	54.0	.....	.....	.....	.....	2.6	61.0	2.63	62.0	.....	.....
15	2.40	54.0	.....	.....	.....	.....	2.6	61.0	2.62	61.7	.....	.....
16	2.40	54.0	.....	.....	.....	.....	2.63	62.0	2.60	61.0	.....	.....
17	2.35	52.2	.....	.....	.....	.....	2.62	61.7	2.63	62.0	.....	.....
18	.....	.0	.....	.....	.....	.....	2.55	59.2	2.63	62.0	.....	.....
19	2.40	54.0	.....	.....	.....	.....	2.65	62.8	2.63	62.0	.....	.....
20	2.40	54.0	.....	.....	.....	.....	2.62	61.7	2.62	61.7	.....	.....
21	2.55	59.2	.....	.....	.....	.....	1.38	23.0	2.60	61.0	.....	.....
22	2.55	59.2	.....	.....	.....	.....	1.32	21.5	2.60	61.0	.....	.....
23	2.55	59.2	.....	.....	.....	.....	2.59	60.6	2.30	50.5	.....	.....
24	2.55	59.2	.....	.....	.....	.....	2.55	59.2	2.63	62.0	.....	.....
25	2.55	59.2	.....	.....	.....	.....	1.42	24.0	2.63	62.0	.....	.....
26	2.50	57.5	.....	.....	.....	.....	1.40	23.5	2.65	62.8	.....	.....
27	2.35	52.2	.....	.....	.....	.....	1.30	21.0	2.63	62.0	.....	.....
28	2.35	52.2	.....	.....	.....	.....	1.30	21.0	2.65	62.8	.....	.....
29	2.35	52.2	.....	.....	.....	.....	1.32	21.5	2.63	62.0	.....	.....
30	2.5	57.5	.....	.....	.....	.....	1.38	23.0	2.60	61.0	.....	.....
31	.....	.....	.....	.....	.....	.....	2.64	62.4	2.60	61.0	.....	.....

NOTE.—No records May 10 to July 11. No flow in canal Apr. 13 and 18, July 13, and Sept. 3. It is believed that the canal was in use throughout the year and that the flow was fairly uniform. Daily discharge determined from a well-defined rating curve.

Monthly discharge of Lagrange Water & Power Co.'s canal near Lagrange, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
April (12–30)	59.2	0	49.7	1,870	B.
May (1–9)	61	48.8	57.7	1,030	B.
July (12–31)	64.5	0	42.7	1,690	B.
August	62.8	59.2	61.2	3,760	B.
September (1–11)	62.8	0	54.9	1,200	B.

JAWBONE CREEK NEAR TUOLUMNE, CAL.

This station, which is located 1½ miles above the mouth of the stream, at the Jawbone ranger station in the Stanislaus National Forest, about 12 miles southeast of Tuolumne, in the NE. ¼ SE. ¼ sec. 33, T. 1 N., R. 18 E., M. D. B. and M., was established September 13, 1910.

No tributaries enter below the gage. A small ditch takes water above the station for irrigation at the ranger's camp.

The vertical staff gage is fastened to a cottonwood tree on the right bank about 100 feet below the trail crossing.

At high stages discharge measurements may be made from an old bridge about 1,000 feet below.

Both banks are high and wooded and not subject to overflow. The bed of the stream is composed of gravel and bowlders and the current is swift.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Jawbone Creek near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	J. E. Stewart	10	8.7	0.20	2.9
Oct. 20	H. J. Tompkins	10	9.1	.25	4.1
Dec. 2	....do	10	9.1	.30	4.6

NOTE.—All measurements were made by wading.

Daily gage height, in feet, of Jawbone Creek near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	.....	0.29	16	.....	0.30	0.30	0.31
2	.....	.....	0.25	.30	17	.....	.....	.30	.....
3	.....	.....	.25	.65	18	.....	.....	.41	.....
4	.....	.....	.27	.52	19	.....	.....	.....	.....
5	.....	.....	.28	.....	20	.....	.25	.....	.....
6	.....	.....	.29	.....	21	.....	.....	.....	.....
7	.....	.....	.29	.35	22	.....	.....	.....	.....
8	.....	.....	.28	.32	23	.....	.....	.....	.....
9	.....	.....	.29	.32	24	.....	.....	.....	.....
10	.....	.....	.....	.40	25	.....	.....	.....	.....
11	.....	.....	.....	.70	26	.....	.27	.....	.....
12	.....	0.40	.....	.40	27	.....	.....	.....	.....
13	0.20	.....	.32	.35	28	.....	.....	.30	.....
14	.....	.....	.31	.32	29	.....	.....	.30	.....
15	.....	.....	.30	.32	30	.....	.25	.29	.....
					31	.....	.....	.....	.....

CORRAL CREEK NEAR GROVELAND, CAL.

This station, which is located at the Clavey trail crossing, 1 mile west of the forest ranger's station on Jawbone Creek, 2 miles above the mouth of Corral Creek and 15 miles northeast of Groveland, was established October 21, 1910.

The gage is a vertical staff fastened to an alder on the right bank of the trail crossing.

Discharge measurements are made by wading near the gage.

The channel, which is composed of bowlders and gravel, is rough. The left bank is low and may be overflowed.

The station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Corral Creek near Groveland, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 21	H. J. Tompkins	7.5	3.5	0.60	1.0
Dec. 2	.....do	4.0	2.3	.70	1.0

NOTE.—All measurements made by wading.

Gage height, in feet, of Corral Creek near Groveland, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Nov. 4	0.62
6	.64
13	.68
Dec. 1	.70
11	.90

SOUTH FORK OF TUOLUMNE RIVER NEAR GROVELAND, CAL.

This station, which is located at the South Fork trail bridge, one-fourth mile above the mouth, and about 10 miles east of Groveland, was established September 13, 1910.

The Middle Fork of the Tuolumne enters about 2½ miles above the station. At the Hardin ranch, about 7 miles above the mouth, a ditch originally built for mining, diverts water for power. The water is not returned to the river.

The gage is a vertical staff on the middle pier of trail bridge.

At low and medium stages discharge measurements are made by wading near the gage. No equipment has been installed for making measurements at high stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Tuolumne River near Groveland, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 13	J. E. Stewart	11	13	0.27	5.1
Dec. 5	H. J. Tompkins	23.5	31	.98	28

NOTE.—Measurements made by wading.

Gage height, in feet, of South Fork of Tuolumne River near Groveland, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 13	0.27
Oct. 25	.65
Dec. 5	.98
6	.90
12	1.40
13	1.25

CLAVEY RIVER NEAR TUOLUMNE, CAL.

This station, which is located near the Luke Meadow trail, 11 miles above the junction with Tuolumne River, and about 10 miles southeast of Tuolumne, in the NW. ¼ SW. ¼ sec. 24, T. 1 N., R. 17 E., M. D. B. and M., in the Stanislaus National Forest, was established September 12, 1910.

Reed Creek enters about one-half mile above and Indian Creek 300 feet below the station. Power is developed near the mouth of the river.

The gage is a vertical staff in two sections in the left bank of the river 150 feet below the trail bridge.

At low stages discharge measurements are made by wading. A car and cable for high-stage measurements have not yet been installed.

Both banks are high and wooded and not subject to overflow. The channel is composed of bowlders and bed rock and is rough. The current is swift at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Clavey River near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 12	Stewart and Tompkins	16	21	0.40	14
Oct. 22	H. J. Tompkins	17	24	.78	25

NOTE.—Measurements made by wading.

Gage height of Clavey River near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 12	0.4
20	.3
Oct. 20	.9
Nov. 13	1.0
Dec. 1	1.05

INDIAN CREEK[1] NEAR TUOLUMNE, CAL.

This station, which is located at the Clavey River trail bridge, 300 feet above the mouth of the stream, and about 10 miles southeast of Tuolumne, in the Stanislaus National Forest, was established October 22, 1910.

Indian Creek joins Clavey River about half a mile below the mouth of Reed Creek and 1 mile above the mouth of Quilty Creek.

The gage is a vertical staff fastened to an alder on the right bank, just below the trail crossing.

Discharge measurements are made by wading.

The bed of the stream is rough and there is but one channel at all stages. The current is swift.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by H. J. Tompkins by wading.

December 6, 1910: Width, 3.5 feet; area, 1.3 square feet; gage height, 1.02 feet; discharge, 1.0 second-feet.

Gage height of Indian Creek near Tuolumne, Cal., for 1910.

[O. E. Fowler, observer.]

	Feet.		Feet.
Oct. 31	0.91	Nov. 20	1.00
Nov. 1	.91	27	1.00
13	1.00	Dec. 1	1.00
19	1.00		

NORTH FORK OF TUOLUMNE RIVER NEAR TUOLUMNE, CAL.

This station, which is located at the Providence Mine bridge, about 2 miles southeast of Tuolumne, in the SE. ¼ sec. 9, T. 1 N., R. 16 E., M. D. B. and M., was established September 11, 1910.

Basin Slope Creek enters about 3 miles above and Hunter Creek 2 miles below the station.

The gage is a vertical staff fastened to the left abutment of the bridge.

Discharge measurements are made by wading whenever possible, as the section at the bridge is rough.

The banks of this stream are high and wooded and not subject to overflow. The bed of the stream is composed of bed rock, small bowlders and sand and is rough. The current is very swift at high stages.

[1] Known also as Bear Creek.

The station is maintained in cooperation with the United States Forest Srevice.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Tuolumne River near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 11	Stewart and Tompkins	21	20	0.16	6.7
Oct. 23	H. J. Tompkins	14	15	.55	13
Dec. 7	.....do	34	31	.60	22

NOTE.—Measurements made by wading.

Gage height of North Fork of Tuolumne River near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

	Feet.
Sept. 11	0.16
Oct. 20	.41
Dec. 1	.49

HUNTER CREEK NEAR TUOLUMNE, CAL.

This station, which is located at the Luke Meadow road crossing, about 6 miles southeast of Tuolumne, in the NW. ¼ NE. ¼ sec. 19, T. 1 N., R. 17 E., Mount Diablo base and meridian, in the Stanislaus National Forest, was established September 11, 1910.

Hunter Creek joins the North Fork of Tuolumne River about 5 miles below the station.

The gage is a vertical staff fastened to an alder on the left bank 50 feet above the ford.

Discharge measurements are made by wading near the ford.

Both banks are high and wooded and not subject to overflow. The bed of the stream is composed of coarse gravel and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Hunter Creek near Tuolumne, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 11	Stewart and Tompkins	3.7	1.2	0.20	0.5
Dec. 6	H. J. Tompkins	2.0	2.0	.40	2.2

NOTE.—Measurements were made by wading.

Daily gage height, in feet, of Hunter Creek near Tuolumne, Cal., for 1910.

[J. B. Pestoni, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1			0.40	0.42	16				
2					17				
3					18				
4		0.19			19				
5					20	0.45	0.31	0.45	
6					21				
7					22				
8					23		.32		
9		.18			24				
10					25				
11	0.20				26				
12	.21				27			.46	
13			.46		28				
14	.27				29		.33		
15					30				
					31		.40		

STANISLAUS RIVER BASIN.

GENERAL FEATURES.

Stanislaus River drains a long, narrow basin lying on the western slope of the Sierra, north of the Tuolumne basin, south of the Calaveras and Mokelumne basins, and west of the Walker River basin, from which it is separated for a distance of about 25 miles by the Sierra divide. The length of the basin from the valley rim to the crest of the divide is about 75 miles; its width averages about 12 miles in the foothills and less than 25 miles near the eastern border. North Fork above and the main stream below form the boundary between Calaveras and Tuolumne counties. The total drainage area above the valley is about 950 square miles.

Stanislaus River has its source in small glacial lakes and on high peaks of the Sierra divide, and flows southwestward to its junction with the lower San Joaquin about 15 miles west of Modesto. It has a total length of about 120 miles, of which about 80 miles is in the mountains and 40 miles in the valley. The main stream is formed by the confluence of its three principal forks heading well back in the mountains. Middle Fork, the largest and most important, unites with North Fork about 12 miles north of Sonora and 30 or 35 miles above the valley rim; South Fork joins the main stream about 8 miles below the junction of North and Middle forks.

STANISLAUS RIVER AT KNIGHTS FERRY, CAL.

A gaging station was established on Stanislaus River May 3, 1895, at the railroad bridge half a mile north of Oakdale. On July 30, 1898, a cable was placed about 1,000 feet below the railroad bridge, and the station was maintained at this point until February 16, 1901, when it was discontinued.

The present station, which is located in the NE. ¼ sec. 29, T. 1 S., R. 12 E., M. D. B. and M., at Knights Ferry, about 12 miles northeast of Oakdale, was established May 19, 1903.

No important tributaries enter below the station or for many miles above. South Fork joins the main stream about 25 miles above the station.

Numerous ditches divert water from Stanislaus River for mining operations, but most of the water is returned to the river. Some water, however, is diverted from the South Fork and turned into the Tuolumne basin. Water which is not returned to Stanislaus River is also diverted from North Fork for use in the vicinity of Murphy and Angels.

The Stanislaus Water Co. diverts water about 3 miles above Knights Ferry for power development and also for irrigating land between Knights Ferry and Stockton. The amount used for power is returned to the river through the power house about 1,000 feet above the gaging station. The developed and acquired water rights probably exceed the low-water flow of the stream.

The staff gage, the datum of which has not been changed since the station was established, is in several sections on the right bank.

Discharge measurements are made from a cable 25 feet above the gage.

The conditions for obtaining accurate discharge data at this station are not the best, on account of excessive velocities at high stages and changing conditions of control at low and moderate stages. About 800 feet above the station the stream is divided into two channels by an island, and a low dam spans each channel at the head of the island. On the right bank below one of these dams is a power house which operates with water taken from behind the dam, and also from the ditch heading about 3 miles above. The tail water returns to the river, and varies with the load at different hours of the day, thus affecting the gage height somewhat at low stages. The channel section at the station is also subject to slight change, and both banks overflow to some extent in high floods.

The 1910 rating curve is well defined and the record is good.

Discharge measurements of Stanislaus River at Knights Ferry, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 2	J. E. Stewart	154	424	7.72	1,560
Mar. 30	.....do	200	643	9.00	3,040
May 17	.....do	203	713	9.30	3,600
June 27	.....do	132	285	6.62	669
July 16	.....do	110	205	6.00	305
Aug. 27	.....do	91	154	5.54	151
Nov. 1	W. V. Hardy	75	141	5.58	131

Daily gage height, in feet, of Stanislaus River at Knights Ferry, Cal., for 1910.

[E. J. Coop, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10.9	8.05	8.4	9.2	9.45	9.5	6.55	5.8	5.4	5.45	5.7	5.7
2	9.5	7.9	8.45	9.35	9.2	9.35	6.6	5.9	5.4	5.45	5.7	5.7
3	8.8	7.7	8.7	9.3	9.15	8.9	6.45	5.9	5.4	5.5	5.7	5.7
4	8.45	7.65	8.85	9.35	9.05	8.7	6.45	5.8	5.4	5.5	5.65	5.95
5	8.15	7.6	8.8	9.6	8.75	8.15	6.4	5.9	5.6	5.5	5.7	6.35
6	8.1	7.55	8.85	9.5	8.7	8.05	6.35	5.5	5.4	5.5	5.55	6.1
7	8.05	7.7	8.8	9.6	8.55	7.85	6.3	5.45	5.4	5.5	5.55	6.0
8	7.85	7.65	8.85	10.0	9.8	7.75	6.1	5.5	5.4	5.5	6.0	6.0
9	7.85	7.7	9.05	10.3	10.2	7.8	6.1	5.5	5.4	5.45	5.9	6.35
10	7.85	7.8	9.1	10.2	10.3	7.8	6.1	5.4	5.4	5.5	5.6	6.15
11	7.7	7.55	9.15	10.3	10.1	7.85	6.2	5.45	5.4	5.5	5.6	6.6
12	7.6	7.5	9.3	9.7	9.6	7.9	6.35	5.6	5.4	5.7	5.75	6.9
13	7.55	7.6	9.3	9.65	9.7	7.8	6.25	5.8	5.5	5.9	5.7	6.5
14	7.9	7.7	9.35	10.05	9.6	7.65	6.05	5.7	5.4	5.85	5.75	6.3
15	8.1	7.7	9.15	10.05	9.75	7.4	6.05	5.6	5.4	5.8	5.75	6.2
16	9.05	7.7	8.8	10.3	9.55	7.15	6.1	5.5	5.45	5.8	5.75	6.15
17	8.45	7.7	8.8	10.75	9.2	7.2	6.0	5.55	6.1	5.7	5.8	6.0
18	7.95	7.55	9.4	10.85	9.05	7.1	6.05	.....	6.05	5.7	5.7	5.95
19	7.8	7.7	11.05	10.95	9.1	7.0	6.1	.....	5.85	5.7	5.65	5.85
20	7.7	7.85	11.6	11.1	9.05	7.3	6.35	.....	5.65	5.65	5.6	5.8
21	7.6	7.7	11.0	10.65	9.0	7.2	6.3	5.45	5.65	5.7	5.7	5.85
22	7.7	7.6	10.4	10.5	9.1	6.95	6.1	5.45	5.6	5.7	5.65	5.8
23	8.05	7.85	10.95	10.7	9.5	6.85	6.0	5.4	5.5	5.7	5.65	5.8
24	9.25	7.7	9.95	10.8	9.6	6.8	6.0	5.4	5.5	5.6	5.8	5.8
25	8.95	7.8	9.55	10.8	9.6	6.75	5.9	5.4	5.5	5.6	5.75	5.75
26	8.5	7.8	9.3	10.8	9.2	6.6	5.7	5.45	5.5	5.65	5.8	5.7
27	8.35	7.85	9.1	11.0	9.1	6.7	5.8	5.4	5.5	5.65	5.9	5.8
28	8.2	7.95	9.1	11.45	9.5	6.8	5.8	5.4	5.5	5.6	5.8	5.75
29	8.15	.....	8.95	10.5	9.55	6.7	5.8	5.4	5.65	5.65	5.7	5.7
30	8.05	.....	8.9	9.9	9.4	6.6	5.8	5.45	5.5	5.5	5.7	5.7
31	8.0	.....	9.0	.....	9.4	.....	5.6	5.4	.....	5.5	.....	5.8

Daily discharge, in second-feet, of Stanislaus River at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,370	1,910	2,340	3,400	3,760	3,840	598	219	105	117	185	185
2	3,840	1,740	2,400	3,620	3,400	3,620	631	258	105	117	185	185
3	2,860	1,530	2,730	3,540	3,330	2,990	536	258	105	129	185	185
4	2,400	1,480	2,920	3,620	3,190	2,730	536	219	105	129	170	280
5	2,030	1,430	2,860	3,990	2,800	2,030	506	258	156	129	185	478
6	1,970	1,380	2,920	3,840	2,730	1,910	478	129	105	129	142	349
7	1,910	1,530	2,860	3,990	2,540	1,680	451	117	105	129	142	301
8	1,680	1,480	2,920	4,640	4,310	1,580	349	129	105	129	301	301
9	1,680	1,530	3,190	5,170	4,990	1,630	349	129	105	117	258	478
10	1,680	1,630	3,260	4,990	5,170	1,630	349	105	105	129	156	374
11	1,530	1,380	3,330	5,170	4,810	1,680	399	117	105	129	156	631
12	1,430	1,530	3,540	4,150	3,990	1,740	478	156	105	185	202	844
13	1,380	1,430	3,540	4,070	4,150	1,630	425	219	129	258	185	566
14	1,740	1,530	3,620	4,720	3,990	1,480	325	185	105	238	202	451
15	1,970	1,530	3,330	4,720	4,230	1,250	325	156	105	219	202	399
16	3,190	1,530	2,860	5,170	3,920	1,040	349	129	117	219	202	374
17	2,400	1,530	2,860	6,060	3,400	1,080	301	142	349	185	219	301
18	1,800	1,380	3,690	6,260	3,190	1,000	325	142	325	185	185	280
19	1,630	1,530	6,700	6,480	3,260	920	349	142	238	185	170	238
20	1,530	1,680	8,000	6,810	3,190	1,160	478	129	170	170	156	219
21	1,430	1,530	6,590	5,850	3,120	1,080	451	117	170	185	185	238
22	1,530	1,430	5,360	5,550	3,260	882	349	117	156	185	170	219
23	1,910	1,680	6,480	5,950	3,840	808	301	105	129	185	170	219
24	3,470	1,530	4,560	6,160	3,990	771	301	105	129	156	219	219
25	3,060	1,630	3,920	6,160	3,990	736	258	105	129	156	202	202
26	2,470	1,630	3,540	6,160	3,400	631	185	117	129	170	219	185
27	2,280	1,680	3,260	6,590	3,260	700	219	105	129	170	258	219
28	2,090	1,800	3,260	7,630	3,840	771	219	105	129	156	219	202
29	2,030	.....	3,060	5,550	3,920	700	219	105	170	170	185	185
30	1,910	.....	2,990	4,470	3,690	631	219	117	129	129	185	185
31	1,850	.....	3,120	.....	3,690	.....	156	105	.....	129	.....	219

NOTE.—Daily discharge determined from a well defined rating curve. Discharge Aug. 18 to 20 estimated.

Monthly discharge of Stanislaus River at Knights Ferry, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	6,370	1,380	2,170	133,000	A.
February	1,910	1,380	1,560	86,600	A.
March	8,000	2,340	3,740	230,000	B.
April	7,630	3,400	5,150	306,000	B.
May	5,170	2,540	3,690	227,000	B.
June	3,840	631	1,480	88,100	A.
July	631	156	368	22,600	A.
August	258	105	146	8,980	A.
September	349	105	142	8,450	A.
October	258	117	162	9,960	A.
November	301	142	193	11,500	A.
December	844	185	313	19,200	A.
The year	8,000	105	1,590	1,150,000	

STANISLAUS WATER CO.'S CANAL NEAR KNIGHTS FERRY, CAL.

This canal diverts water from the right bank of Stanislaus River at a point about 3 miles above Knights Ferry. At some distance below the intake the Schell ditch diverts a small quantity of water from the main canal for irrigation. The flow in the ditch, as determined by measurement in 1909, is about 6 second-feet and is assumed to be constant. About half a mile above Knights Ferry is another diversion from the main canal through a pressure pipe to the power house on the bank of the river, and the water thus diverted is used for power and then returned to the river about 1,000 feet above the gaging station.

The gaging station, which is on the main canal below all diversions, is on the Oakdale road about one-half mile from Knights Ferry and about 200 feet below the point where the canal passes under the flume of Schell ditch, in the NW. ¼ sec. 29, T. 1 S., R. 12 E., M. D. B. and M. It was established June 11, 1904.

The gage is a vertical staff on the left bank at a private bridge across the canal about 20 feet below the foot bridge from which discharge measurements are made.

The rating curve for 1910 is well defined and the record is excellent.

Discharge measurements of Stanislaus Water Co.'s canal at Knights Ferry, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 3	J. E. Stewart	9	17	2.60	49
Mar. 31	do	9	14	2.40	40
May 17	do	9.6	22	3.12	78
June 27	do	9.2	20	2.92	63
July 16	do	9.4	18	2.78	54
Aug. 27	do	9.1	12	2.02	25
Nov. 1	W. V. Hardy	9	15	2.30	37

Daily gage height, in feet, of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

[Otto Dolling, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.6	2.6	2.65	2.35	3.3	3.0	3.2	0.7	2.45	2.45	2.0	2.5
2	2.85	2.6	2.75	2.35	3.3	3.4	3.1	.....	2.55	2.55	2.45	2.0
3	2.6	2.55	2.65	2.6	3.45	3.25	3.1	.....	2.55	2.5	2.5	2.4
4	2.55	2.55	2.6	2.45	3.55	3.2	2.85	.65	2.6	2.65	2.55	2.6
5	2.6	2.6	2.7	1.9	3.4	3.1	2.85	2.5	2.5	2.6	2.6	2.45
6	2.55	2.6	1.45	2.1	3.5	3.15	3.05	2.8	2.5	2.55	2.6	2.35
7	2.5	2.55	3.3	1.9	3.45	3.25	3.0	2.8	2.7	2.5	2.6	2.0
8	2.6	2.5	3.3	1.8	3.25	3.4	3.1	2.65	2.55	2.55	.....	1.85
9	2.6	2.5	2.95	1.9	3.15	3.35	2.9	2.5	2.5	2.65	.7	1.4
10	2.55	2.55	3.15	2.5	3.15	3.25	3.15	2.55	2.95	2.6	2.5	2.35
11	2.55	2.55	3.15	2.5	3.2	3.25	3.0	2.55	2.85	2.55	2.55	2.45
12	2.55	2.65	3.15	2.45	3.1	3.5	3.0	2.5	2.7	1.95	2.55	1.9
13	2.5	2.7	1.45	2.45	3.05	3.35	2.95	2.5	2.5	2.5	2.65	2.45
14	2.55	2.65	2.8	2.45	3.1	3.45	2.85	2.85	2.4	2.55	2.55	1.8
15	2.55	2.7	2.2	2.5	3.4	3.25	3.05	2.65	2.7	2.5	2.5	2.35
16	2.6	2.6	2.5	2.8	3.35	3.3	3.05	2.65	2.8	2.6	2.5	2.4
17	2.55	2.65	2.5	2.8	3.4	3.3	2.85	2.65	2.8	2.6	2.55	2.5
18	2.55	2.65	2.25	2.8	3.45	3.25	3.0	2.7	2.7	2.55	2.6	2.55
19	2.5	2.7	2.35	2.9	2.95	3.5	2.95	2.05	2.8	2.5	2.5	2.65
20	2.5	2.7	3.15	2.95	3.4	3.45	3.1	2.55	2.6	2.45	2.65	2.5
21	2.5	2.7	2.4	3.2	3.4	3.5	2.6	2.8	2.8	2.5	2.6	2.5
22	.7	2.6	1.85	3.1	3.35	3.55	2.7	2.6	2.7	1.95	2.55	2.4
23	2.6	2.7	2.5	3.3	3.35	3.4	2.9	2.6	2.65	2.5	2.5	2.4
24	2.55	2.6	2.4	3.55	3.4	3.45	2.55	2.6	2.65	2.5	2.5	2.5
25	2.6	2.65	2.45	3.5	2.9	3.4	2.65	2.5	2.65	2.5	2.5	2.7
26	2.55	2.65	1.9	3.2	3.35	3.25	2.95	2.55	2.6	2.5	2.5	2.45
27	2.6	2.7	2.45	2.75	3.45	3.05	2.7	2.6	2.6	2.55	2.65	2.35
28	2.6	2.65	2.35	3.4	3.25	2.4	3.1	2.65	2.5	2.5	2.55	2.45
29	2.6	.....	2.35	3.2	2.5	3.25	2.75	2.65	2.6	2.6	2.55	2.45
30	2.7	.....	2.45	3.35	3.45	3.2	2.6	2.6	2.55	2.65	2.5	2.45
31	2.5	.....	2.35	.....	3.4	.....	2.75	2.5	.....	2.55	.....	2.45

NOTE.—Water was out of canal during part of day January 22, August 1 and 4, and wholly out August 2 and 3.

Daily discharge, in second-feet, of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	47	47	50	37	89	69	82	0	41	41	23	43
2	60	47	54	37	89	97	75	0	45	45	41	23
3	47	45	50	47	101	86	75	0	45	43	43	39
4	45	45	47	41	109	82	60	0	47	50	45	47
5	47	47	52	20	97	75	60	43	43	47	47	41
6	45	47	10	27	105	78	72	57	43	45	47	37
7	43	45	89	20	101	86	69	57	52	43	47	23
8	47	43	89	17	86	97	75	50	45	45	0	18
9	47	43	66	20	78	93	63	43	43	50	0	9
10	45	45	78	43	78	93	78	45	66	47	43	37
11	45	45	78	43	82	86	69	45	60	45	45	41
12	45	50	78	41	75	105	69	43	52	22	45	20
13	43	52	10	41	72	93	66	43	43	43	50	41
14	45	50	57	41	75	101	60	60	39	45	45	17
15	45	52	31	43	97	86	72	50	52	43	43	37
16	47	47	43	57	93	89	72	50	57	47	43	39
17	45	50	43	57	97	89	60	50	57	47	45	43
18	45	50	33	57	101	86	69	52	52	45	47	45
19	43	52	37	63	66	105	66	25	57	43	43	50
20	43	52	78	66	97	101	75	45	47	41	50	43
21	43	52	39	82	97	105	47	57	57	43	47	43
22	0	47	18	75	93	109	52	47	52	22	45	39
23	47	52	43	89	93	97	63	47	50	43	43	39
24	45	47	39	109	97	101	45	47	50	43	43	43
25	47	50	41	105	63	97	50	43	50	43	43	52
26	45	50	20	82	93	86	66	45	47	43	43	41
27	47	52	41	54	101	72	52	47	47	45	50	37
28	47	50	37	97	85	39	75	50	43	43	45	41
29	47	.....	37	82	43	86	54	50	47	47	45	41
30	52	.....	41	93	101	82	47	47	45	50	43	41
31	43	.....	37	.....	97	.....	54	43	.....	45	.....	41

NOTE.—Daily discharge determined from a well defined rating curve.

Monthly discharge of Stanislaus Water Co.'s canal at Knights Ferry, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	60	0	44.6	2,740	A.
February	52	43	48.4	2,690	A.
March	89	10	47.3	2,910	A.
April	109	17	54.8	3,260	A.
May	109	43	88.7	5,450	A.
June	109	39	89.0	5,300	A.
July	82	45	64.3	3,950	A.
August	60	0	41.6	2,560	A.
September	66	39	49.1	2,920	A.
October	50	22	43.4	2,670	A.
November	50	0	41.3	2,460	A.
December	52	9	37.1	2,280	A.
The year	109	0	54.1	39,200	

Daily discharge, in second-feet, of Stanislaus River, Stanislaus Water Co.'s canal, and Schell ditch at Knights Ferry, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6,420	1,960	2,400	3,440	3,860	3,920	686	225	152	164	214	234
2	3,910	1,790	2,460	3,660	3,500	3,720	712	264	156	168	232	214
3	2,910	1,580	2,790	3,590	3,440	3,080	617	264	156	178	234	230
4	2,450	1,530	2,970	3,670	3,300	2,820	602	225	158	185	221	333
5	2,080	1,480	2,920	4,020	2,900	2,110	572	307	205	182	238	525
6	2,020	1,430	2,940	3,870	2,840	1,990	556	192	154	180	195	392
7	1,960	1,580	2,960	4,020	2,650	1,770	526	180	163	178	195	330
8	1,730	1,530	3,020	4,660	4,400	1,680	430	185	156	180	307	325
9	1,730	1,580	3,260	5,200	5,070	1,730	418	178	154	173	264	493
10	1,730	1,680	3,340	5,040	5,250	1,730	433	156	177	182	205	417
11	1,580	1,430	3,410	5,220	4,900	1,770	474	168	171	180	207	678
12	1,480	1,590	3,620	4,200	4,070	1,850	553	205	163	213	253	870
13	1,430	1,490	3,560	4,120	4,230	1,730	497	268	178	307	241	613
14	1,790	1,590	3,680	4,770	4,070	1,590	391	251	150	289	253	474
15	2,020	1,590	3,370	4,770	4,330	1,340	403	212	163	268	251	442
16	3,240	1,580	2,910	5,230	4,020	1,140	427	185	180	272	251	419
17	2,450	1,590	2,910	6,120	3,500	1,180	367	198	412	238	270	350
18	1,850	1,440	3,730	6,320	3,300	1,090	400	200	383	236	238	331
19	1,680	1,590	6,740	6,550	3,330	1 030	421	173	301	234	219	294
20	1 580	1 740	8 080	6 880	3,290	1,270	559	180	223	217	212	268
21	1,480	1,590	6,640	5,940	3,220	1,190	504	180	233	234	238	287
22	1,540	1,480	5,380	5,630	3,360	997	407	170	214	213	221	264
23	1,960	1,740	6,530	6,040	3,940	911	370	158	185	234	219	264
24	3,520	1,580	4,600	6,280	4,090	878	352	158	185	205	268	268
25	3,110	1,690	3,970	6,270	4,060	839	314	154	185	205	251	260
26	2,520	1,690	3,570	6,250	3,500	723	257	168	182	219	268	232
27	2,330	1,740	3,310	6,650	3,370	778	277	158	182	221	314	262
28	2,140	1,860	3,300	7,730	3,930	816	300	161	178	205	270	249
29	2,080	.....	3,100	5,640	3,970	792	279	161	223	223	236	232
30	1,970	.....	3,040	4,570	3,800	719	272	170	180	185	234	232
31	1,900	.....	3,160	.....	3,790	.....	216	154	.....	180	.....	266

NOTE.—Daily discharge is the sum of the discharge at the river station, the canal station, and Schell ditch. Flow in Schell ditch assumed to be constant and equal to 6 second-feet, as indicated by measurements made in 1909.

Monthly discharge of Stanislaus River, Water Co.'s canal, and Schell ditch at Knights Ferry, Cal., for 1910.

[Drainage area, 935 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	6,420	1,430	2,280	2.44	2.81	140,000
February	1,960	1,430	1,610	1.72	1.79	89,400
March	8,080	2,400	3,800	4.06	4.68	234,000
April	7,730	3,440	5,210	5.57	6.21	310,000
May	5,250	2,650	3,780	4.04	4.66	232,000
June	3,920	719	1,570	1.68	1.87	93,400
July	712	216	438	.468	.54	26,900
August	307	154	194	.207	.24	11,900
September	412	150	197	.211	.24	11,700
October	307	164	211	.226	.26	13,000
November	314	195	241	.258	.29	14,300
December	870	214	356	.381	.44	21,900
The year	8,080	150	1,660	1.78	24.03	1,200,000

NOTE.—These estimates include the flow in the river, the Stanislaus Water Co.'s canal, and the Schell ditch, but do not include diversions above the station into the Tuolumne basin.

ROSE CREEK NEAR JUPITER, CAL.

This station, which is located just above the bridge at the trail crossing, about 2 miles northwest of Jupiter, in the SE. ¼ sec. 17, T. 3 N., R. 15 E., M. D. B. and M., was established September 8, 1910.

Eagle Creek enters 1½ miles above and Knight Creek 2½ miles below the station. The area drained by Rose Creek is rough and is covered chiefly with brush with some merchantable timber.

The gage is a vertical staff fastened to a tree on the right bank, 100 feet above the bridge.

Discharge measurements are made by wading near the gage.

The channel is composed of gravel and small bowlders and the current is swift. At low and medium stages the stream is confined to one channel. At extreme high water the left bank is overflowed and a second channel is formed.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rose Creek near Jupiter, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 8	J. E. Stewart	.....	.....	0.02	[a] 0.03
Oct. 25	H. J. Tompkins	3.0	2.2	.35	1.2
Dec. 10	.....do	3.5	2.0	.58	3.9

[a] Estimated.

NOTE.—Measurements made by wading.

Daily gage height, in feet, of Rose Creek near Jupiter, Cal., for 1910.

[Oliver P. Brownlow, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.31	0.41	.....	11	0.48	.....	.....	21	.....	.....	.....
2	.....	.....	.....	12	.....	0.59	.....	22	.....	.....	.....
3	.....	.....	.....	13	.....	.....	0.63	23	.....	.....	.....
4	.30	.....	0.77	14	.....	.....	.....	24	.....	.....	0.50
5	.....	.42	.....	15	.35	.47	.....	25	0.35	.....	.....
6	.....	.....	.64	16	.....	.....	.....	26	0.36	0.61	.....
7	.....	.....	.....	17	.....	.....	.52	27	.....	.....	.51
8	.31	.....	.....	18	.....	.....	.....	28	.....	.52	.....
9	.....	.....	.58	19	.37	.52	.....	29	.38	.51	.....
10	.....	.44	.....	20	.....	.....	.51	30	.....	.....	.50
								31	.....	.....	.....

KNIGHT CREEK NEAR JUPITER, CAL.

This station, which is located at the trail crossing, 5 miles west of Jupiter, in the SE. ¼ sec. 8, T. 3 N., R. 15 E., Mount Diablo Base and Meridian, was established September 9, 1910.

Knight Creek joins Rose Creek about 2 miles below the gage. Above the station a small amount of water is diverted for irrigation.

The gage is a vertical staff fastened to a large alder on the right bank, 10 feet above the trail crossing.

Discharge measurements are made by wading near the gage.

The bed of the stream is composed of gravel and sand and is smooth at the gaging section. There is one channel at all stages.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Knight Creek near Jupiter, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Sept. 9	J. E. Stewart	.....	.....	0.20	a0.05
Dec. 10[b]	H. J. Tompkins	2	1.3	.52	.6

[a] Estimated. [b] Made by wading.

Daily gage height, in feet, of Knight Creek near Jupiter, Cal., for 1910.

[H. C. Summers, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1	.....	.....	0.35	.....	16	.....	.....	0.45	.....
2	.....	.....	.....	0.35	17	.....	.....	.5	.....
3	.....	.....	.....	.....	18	.....	.....	.....	0.45
4	.....	.....	.....	.....	19	.....	.....	.....	.....
5	.....	.....	.35	.....	20	.....	.....	.....	.....
6	.....	.....	.....	.....	21	.....	.....	.....	.....
7	.....	.....	.....	.4	22	.....	.....	.35	.....
8	.....	.....	.....	.....	23	.....	.....	.....	.45
9	0.2	.....	.....	.....	24	.....	0.3	.....	.....
10	.....	0.3	.4	.....	25	.....	.....	.....	.....
11	.....	.....	.....	.....	26	.....	.....	.....	.....
12	.....	.35	.....	.....	27	.....	.....	.....	.....
13	.....	.....	.....	.....	28	.....	.35	.....	.....
14	.....	.....	.....	.45	29	.....	.....	.35	.....
15	.....	.3	.....	.....	30	.....	.....	.....	.5
					31	.....	.35	.....	.....

SOUTH FORK OF STANISLAUS RIVER NEAR COLUMBIA, CAL.

This station, which is located at the highway bridge at Italian Bar, in the SE. ¼ sec. 33, T. 3 N., R. 15 E., M. D. B. and M., about 5 miles northeast of Columbia, was established September 6, 1910.

Deer Creek enters about 4½ miles above and Fivemile Creek 1½ miles below the gage. About 11 miles above the station water is diverted for domestic use at Sonora and Tuolumne. The low-water flow at the station is controlled by storage.

The gage is a vertical staff fastened to the middle pier of the bridge.

Discharge measurements at low and medium stages are made by wading about 200 feet below the gage. At high stages fair measurements can be made from the bridge.

The banks are high and wooded and not subject to overflow. The channel is composed of gravel, bed rock, and bowlders and appears permanent.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Fork of Stanislaus River near Columbia, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 10	Stewart and Tompkins	9	6.0	0.32	2.4
Oct. 24	H. J. Tompkins	5.5	8.2	.55	5.2
Dec. 9	do	10	9.3	.71	6.9
11	do	20	34	1.00	21

NOTE.—Measurements made by wading.

Daily gage height, in feet, of South Fork of Stanislaus River near Columbia, Cal., for 1910.

[Oliver P. Brownlow, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	0.45	0.50	.....	11	0.80	.....	.....	21	.....	.....	.....
2	.....	.....	.....	12	.....	0.72	.....	22	0.62	.....	.....
3	.....	.....	.....	13	.....	.....	0.76	23	.....	.....	.....
4	.43	.....	0.95	14	.....	.....	.....	24	.....	.....	0.69
5	.....	.51	.....	15	.56	.62	.....	25	.70	.....	.....
6	.....	.....	.72	16	.....	.....	.....	26	.....	0.82	.70
7	.....	.....	.....	17	.....	.....	.70	27	.....	.....	.....
8	.41	.54	.....	18	.57	.....	.....	28	.....	.....	.....
9	.....	.....	.71	19	.....	.....	.....	29	.49	.71	.....
10	.....	.....	.....	20	.....	.61	.71	30	.....	.....	.....
								31	.....	.....	.70

CALAVERAS RIVER BASIN.

CALAVERAS RIVER AT JENNY LIND, CAL.

Calaveras River drains an area on the western slope of the Sierra, north of the Stanislaus basin and south of the Mokelumne basin. The total area of this basin above the border of San Joaquin Valley is about 500 square miles.

Calaveras River is formed by the confluence of its North and South forks near San Andreas, and flows southwestward to its junction with the lower San Joaquin, a few miles west of Stockton. Its total length is about 80 miles, of which 35 miles are in the valley and 45 miles in the mountains.

The basin is almost wholly a foothill region. The hills are low, and here and there they are separated by small, irregular valleys. The highest point in the basin is 6,000 feet in altitude, but only a very small part exceeds 4,000 feet.

The gaging station, which is located at the wagon bridge on the Milton road, about one-fourth mile from Jenny Lind post office, in the SE. ¼ sec. 22, T. 3 N., R. 10 E., M. D. B. and M., was established December 1, 1906, by the United States Weather Bureau, and has been rated by the Geological Survey. The records are of greatest immediate value in devising protective measures against the flooding of the city of Stockton during the winter.

The station is well up in the foothills, and there are a few small intermittent tributaries below. Cosgrove, Slate, and Bear creeks enter about 5 miles above the station. North and South forks unite about 15 miles above.

No water is diverted immediately above the station. The acquired water rights are for mining and power operations.

The gage, the datum of which has not been changed since the station was established, is a vertical staff in two sections on the right bank.

Discharge measurements are made from the bridge near the gage.

The conditions for obtaining accurate discharge data are not very good. At low stages the stream at the station is about 100 feet wide and 2 feet deep, and the current is very sluggish. A considerable change in flow makes very little difference in the gage height, so that more or less error arises from the fact that the gage record is only to tenths of feet. At low stages measurements can be made at other sections by wading, thus eliminating inaccuracies from that source. At flood stages the current is very swift and the channel, which is composed of gravel and cobblestones, shifts slightly.

The 1910 rating curve is well defined and the record is fairly satisfactory.

The United States Weather Bureau furnished the gage height record for the periods January 1 to March 11 and November 1 to December 31.

Discharge measurements of Calaveras River at Jenny Lind, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 20	J. E. Stewart	130	368	1.31	519
Mar. 12	do	130	306	.80	238
29	do	130	394	1.30	493
May 21	do	117	234	.07	67
June 25[a]	do	71	80	−.21	21
July 15[a]	do	25	8.2	−.47	5.8

[a] Measurement made by wading.

Daily gage height, in feet, of Calaveras River at Jenny Lind, Cal., for 1910.

[Paul F. Sinclair, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.2	1.0	0.7	1.05	0.45	0.0	−0.28	.....	.....	−0.2	−0.2	0.0
2	2.2	.9	.7	1.0	.4	.....	−.3	.....	.....	−.2	−.2	.0
3	2.0	.8	.7	.95	.4	.....	−.3	.....	.....	−.2	−.2	.0
4	1.5	.8	.7	.9	.35	.....	−.3	.....	.....	.....	−.2	.1
5	1.1	.8	.7	.9	.35	.....	−.32	.....	.....	.....	−.2	.1
6	.7	.8	.7	.85	.35	.....	.....	.....	.....	.....	−.2	.1
7	.6	1.0	.6	.85	.3	.....	.....	.....	.....	.....	−.2	.1
8	.6	1.0	.6	.8	.3	.....	.....	.....	.....	.....	−.15	.1
9	.6	1.0	.6	.75	.3	.....	.....	.....	.....	.....	−.15	.0
10	.6	1.1	.5	.75	.25	.....	.....	.....	.....	.....	−.1	.0
11	.6	1.0	.5	.8	.25	.....	.....	.....	.....	.....	−.1	.0
12	.5	.9	.8	.75	.3	.....	.....	.....	.....	.....	−.05	.4
13	.5	.8	.75	.7	.25	.....	.....	.....	.....	.....	−.05	.2
14	.9	.8	.8	.65	.25	.....	−.32	.....	.....	.....	−.05	.1
15	1.6	.8	.8	.6	.2	.....	−.35	.....	.....	.....	.0	.0
16	3.3	.8	.8	.6	.2	.....	−.38	.....	.....	.....	−.05	
17	1.6	.8	.75	.55	.2	.....	−.4	.....	.....	.....	−.05	.0
18	1.6	.8	.8	.55	.2	.....	−.45	.....	.....	.....	.0	.0
19	1.6	.8	.9	.55	.15	.....	−.48	.....	.....	.....	.0	.0
20	1.5	.8	1.25	.5	.15	.....	−.5	.....	.....	.....	.05	.0
21	1.3	.8	2.5	.5	.15	.....	−.5	.....	.....	.....	.05	.0
22	1.3	.8	3.6	.5	.15	.....	−.52	.....	.....	−.2	.05	.0
23	1.3	.9	4.4	.45	.15	.....	−.52	.....	.....	.....	.0	.0
24	3.2	.9	2.5	.4	.1	.....	−.55	.....	.....	.....	.0	.0
25	2.0	.9	2.0	.35	.1	−.2	−.55	.....	.....	.....	.05	.0
26	2.2	.7	1.7	.35	.1	−.23	−.55	.....	.....	.....	.2	.0
27	1.8	.7	1.5	.35	.05	−.22	−.58	.....	.....	.....	.15	.0
28	1.7	.7	1.2	.5	.05	−.25	−.58	.....	.....	.....	.15	.0
29	1.3	.....	1.1	.5	.05	−.27	−.58	.....	.....	.....	.0	.0
30	1.0	.....	1.1	.45	.05	−.28	−.6	.....	.....	.....	.0	.0
31	.9	.....	1.05	.....	.0	.....	−.6	.....	.....	.....	.....	.0

NOTE.—The record for the periods Jan. 1 to Mar. 11, and Nov. 1 to Dec. 31, were furnished by the United States Weather Bureau. The observer was absent June 1 to 24. No record was kept for the periods Aug. to Sept. 30, and during most of the month of October. Probably no flow during most of the months of August and September.

Daily discharge, in second-feet, of Calaveras River at Jenny Lind, Cal., for 1910.

Date.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4,490	330	214	355	146	51	17	.....	.....	23	23	51
2	1,230	284	214	330	134	50	15	.....	.....	23	23	51
3	1,040	246	214	307	134	49	15	.....	.....	23	23	51
4	625	246	214	284	122	48	15	.....	.....	.....	23	68
5	380	246	214	284	122	46	14	.....	.....	.....	23	68
6	214	246	214	265	122	45	14	.....	.....	.....	23	68
7	185	330	185	265	110	44	14	.....	.....	.....	23	68
8	185	330	185	246	110	43	14	.....	.....	.....	29	68
9	185	330	185	230	110	42	14	.....	.....	.....	29	51
10	185	380	159	230	98	40	14	.....	.....	.....	35	51
11	185	330	159	246	98	39	14	.....	.....	.....	35	51
12	159	284	246	230	110	38	14	.....	.....	.....	43	134
13	159	246	230	214	98	37	14	.....	.....	.....	43	87
14	284	246	246	200	98	36	14	.....	.....	.....	43	68
15	700	246	246	185	87	34	12	.....	.....	.....	51	51
16	2,690	246	246	185	87	33	10	.....	.....	.....	43	51
17	700	246	230	172	87	32	9	.....	.....	.....	43	51
18	700	246	246	172	87	31	7	.....	.....	.....	51	51
19	700	246	284	172	78	30	5	.....	.....	.....	51	51
20	625	246	462	159	78	28	4	.....	.....	.....	60	51
21	493	246	1,550	159	78	27	4	.....	.....	.....	60	51
22	493	246	3,230	159	78	26	4	.....	.....	23	60	51
23	493	284	4,980	146	78	25	4	.....	.....	.....	51	51
24	2,530	284	1,550	134	68	24	3	.....	.....	.....	51	51
25	1,040	284	1,040	122	68	23	3	.....	.....	.....	60	51
26	1,230	214	780	122	68	21	3	.....	.....	.....	87	51
27	860	214	625	122	60	21	2	.....	.....	.....	78	51
28	780	214	432	159	60	19	2	.....	.....	.....	78	51
29	493	.....	380	159	60	17	2	.....	.....	.....	51	51
30	330	.....	380	146	60	17	2	.....	.....	.....	51	51
31	284	.....	355	.....	51	.....	2	.....	.....	.....	.....	51

NOTE.—Daily discharge determined from a rating curve fairly well defined. Discharge estimated June 2 to 24 and July 6 to 13. Channel probably dry during the greater part of August and September. There was probably little change in conditions of flow during October.

Monthly discharge of Calaveras River at Jenny Lind, Cal., for 1910.

[Drainage area, 395 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,490	159	795	2.01	2.32	48,900	A.
February	380	214	269	.681	.71	14,900	A.
Mar	4,980	159	642	1.63	1.88	39,500	A.
April	355	122	205	.519	.58	12,200	A.
May	146	51	91.8	.232	.27	5,640	B.
June	51	17	33.9	.086	.10	2,020	C.
July	17	2	9.0	.023	.03	555	C.
August	.....	.....	.4	.0010	.001	25	D.
September	.....	.....	.0	.0000	.000	0	
October	.....	.....	23.0	.058	.07	1,410	D.
November	87	23	44.8	.113	.13	2,670	B.
December	134	51	58.1	.147	.17	3,570	B
The year	4,980	0	182	.461	6.26	131,000	

NOTE.—Monthly means for August and October estimated from general knowledge of the river during these months. The estimate of zero flow for the month of September is approximate.

MOKELUMNE RIVER BASIN.

GENERAL FEATURES.

The Mokelumne River basin lies on the western slope of the Sierra, north of the Calaveras and Stanislaus River basins, and south of American River basin. Strictly speaking the area drained by Cosumnes River, and several other small tributaries which enter many miles west of the valley border, should be considered as a part of the Mokelumne basin, but this area contributes nothing to the flow of Mokelumne River above the lower Sacramento and San Joaquin delta region. The total area of the basin above the valley rim, exclusive of that drained by the Cosumnes, is about 640 square miles.

The Mokelumne rises in glacial lakelets in Alpine County at an altitude of nearly 10,000 feet above sea level, and flows southwestward to its junction with the lower San Joaquin, about 25 miles northwest of Stockton. It has a total length of about 140 miles, of which approximately 90 miles are in the mountains. For the greater part of its course it forms a boundary between Amador County on the north and Calaveras County on the south. The principal branches are North, Middle, and South forks, which unite about 5 miles above Electra and nearly 40 miles above the rim of the valley. Bear River is tributary to North Fork from the north.

MOKELUMNE RIVER NEAR CLEMENTS, CAL.

This station, which is located at the highway bridge about 1 mile north of Clements, in the NW. ¼ sec. 15, T. 4 N., R. 8 E., M. D. B. and M., was established October 28, 1904.

No important tributaries enter for many miles above or below the station. The three forks unite about 30 miles above Clements, and Cosumnes River enters from the north about 30 miles below Clements.

Several ditches take water for use in mining and in power development in the Mokelumne basin, but most of the water is returned to the river. No water is diverted immediately above the station, except for local irrigation on the bottom lands adjacent to the river. In the upper part of the basin some water is probably diverted into contiguous basins. The acquired water rights on the lower part of the stream probably take the larger part, if not all, of the minimum flow.

The low-water section of the gage is an inclined staff, the upper portion is painted on the pier near the right end of the bridge. No change has ever been made in the gage datum.

Discharge measurements are made from the bridge.

The channel, which is composed of sand and gravel, is subject to slight changes during high water. The 1910 rating curve is well defined and the record is good.

Discharge measurements of Mokelumne River near Clements, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 19	J. E. Stewart	193	416	5.83	1,030
Mar. 13	do	270	918	7.45	2,230
28	do	259	862	7.24	2,050
May 20	do	265	1,110	8.26	3,020
June 24	do	115	269	4.62	408
July 14	do	112	172	3.81	153
Aug. 4[a]	W. V. Hardy	70	67	3.25	60
Oct. 21[a]	J. E. Stewart	80	94	3.60	127

[a] Measurement made by wading.

Daily gage height, in feet, of Mokelumne River near Clements, Cal., for 1910.

[Reba Gaskill, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	6.05	6.7	7.2	7.75	8.35	4.25	3.4	3.35	3.25	3.65	3.9
2	7.45	5.95	6.5	7.15	7.7	8.3	4.15	3.4	3.15	3.25	3.75	4.05
3	6.45	5.85	6.7	7.15	7.3	7.8	4.1	3.3	3.25	3.25	3.65	4.4
4	6.35	5.8	6.9	7.2	7.8	7.75	4.05	3.25	3.2	3.5	3.55	5.1
5	6.1	5.8	6.9	7.1	7.7	6.75	3.9	3.3	3.25	3.4	3.7	4.8
6	6.0	5.8	7.0	7.3	8.45	6.15	4.1	3.35	3.1	3.3	3.75	4.75
7	5.9	5.7	6.9	7.55	8.7	6.0	4.0	3.2	3.2	3.4	3.7	4.7
8	5.9	5.9	6.9	7.75	9.25	6.0	3.85	3.15	3.25	3.4	3.6	4.7
9	5.8	5.75	6.95	8.5	10.3	5.85	3.9	2.95	3.1	3.45	3.55	4.55
10	5.65	5.6	7.05	8.5	9.85	6.0	3.9	2.95	3.2	3.5	3.55	4.55
11	5.65	5.55	7.2	8.35	9.8	5.7	3.85	2.85	3.15	3.25	3.7	5.25
12	5.6	5.5	7.4	7.65	9.6	5.85	4.1	3.05	3.15	3.65	3.75	5.3
13	5.5	5.55	7.3	7.55	9.25	5.7	3.9	3.1	3.1	3.7	4.05	4.85
14	5.75	5.5	7.4	7.85	9.5	5.6	3.85	3.15	3.15	3.6	3.85	4.55
15	6.7	5.55	7.05	8.1	9.55	.....	3.8	3.35	3.3	3.55	3.95	4.9
16	6.55	5.55	6.8	8.4	8.35	.....	3.75	3.6	3.5	3.5	3.9	4.85
17	6.3	5.6	6.8	9.1	8.2	.....	3.75	3.4	3.65	3.45	3.75	4.65
18	6.05	5.45	7.35	9.55	8.05	.....	3.7	3.15	3.9	3.45	3.9	4.5
19	5.8	5.9	9.85	9.75	8.15	.....	3.8	3.25	3.6	3.5	3.85	4.3
20	5.75	5.55	11.4	10.05	8.2	.....	3.9	3.3	3.65	3.6	3.9	4.05
21	5.6	5.5	9.95	9.1	8.3	.....	3.8	3.2	3.65	3.6	3.85	3.9
22	5.55	5.55	9.2	8.9	8.55	.....	4.25	3.25	3.45	3.55	3.95	4.35
23	6.3	5.6	9.4	9.5	8.7	.....	3.7	3.45	3.35	3.75	4.05	4.6
24	7.8	5.5	8.45	9.9	9.2	.....	3.8	3.25	3.25	3.65	4.15	4.2
25	7.35	5.9	8.2	10.0	8.2	4.5	3.7	3.45	3.15	3.55	4.05	3.9
26	6.6	5.8	7.55	10.15	8.3	4.45	3.7	3.35	3.25	3.65	3.95	4.05
27	6.3	5.75	7.3	10.3	8.15	4.45	3.6	3.35	3.2	3.6	4.15	3.95
28	6.15	5.95	7.05	9.65	8.0	4.55	3.7	3.2	3.35	3.65	4.05	3.85
29	6.1	.....	7.0	9.2	7.45	4.4	3.4	3.3	3.3	3.7	4.0	3.95
30	6.1	.....	7.0	8.6	7.85	4.4	3.4	3.25	3.2	3.75	3.95	4.05
31	5.9	.....	7.2	.....	8.25	.....	3.5	3.2	.....	3.75	.....	4.3

Discharge, in second-feet, of Mokelumne River near Clements, Cal., for 1910.

	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	3,600	1,160	1,620	2,020	2,460	3,000	273	84	76	62	130	181
.....	2,220	1,100	1,480	1,980	2,420	2,950	244	84	50	62	149	217
.....	1,440	1,040	1,620	1,980	2,100	2,500	230	69	62	62	130	321
.....	1,380	1,010	1,780	2,020	2,500	2,460	217	62	56	102	111	610
.....	1,200	1,010	1,780	1,940	2,420	1,660	181	69	62	84	139	475
.....	1,130	1,010	1,860	2,100	3,080	1,240	230	76	45	69	149	454
.....	1,070	950	1,780	2,300	3,310	1,130	204	56	56	84	139	433
.....	1,070	1,070	1,780	2,460	3,850	1,130	170	50	62	84	120	433
.....	1,010	980	1,820	3,130	4,900	1,040	181	32	45	93	111	375
.....	920	890	1,900	3,130	4,450	1,130	181	32	56	102	111	375
.....	920	860	2,020	3,000	4,400	950	170	25	50	62	139	685
.....	890	830	2,180	2,380	4,200	1,040	230	40	50	130	149	710
.....	830	860	2,100	2,300	3,850	950	181	45	45	139	217	498
.....	980	830	2,180	2,540	4,100	890	170	50	50	120	170	375
.....	1,620	860	1,900	2,770	4,150	830	159	76	69	111	192	520
.....	1,520	860	1,700	3,040	3,000	770	149	120	102	102	181	498
.....	1,340	890	1,700	3,700	2,860	710	149	84	130	93	149	414
.....	1,160	800	2,140	4,150	2,720	660	139	50	181	93	181	356
.....	1,010	1,070	4,450	4,350	2,820	610	159	62	120	102	170	288
.....	980	860	6,110	4,650	2,860	565	181	69	130	120	181	217
.....	890	830	4,550	3,700	2,950	520	159	56	130	120	170	181
.....	860	860	3,800	3,500	3,180	475	273	62	93	111	192	304
.....	1,340	890	4,000	4,100	3,310	433	139	93	76	149	217	394
.....	2,500	830	3,080	4,500	3,800	394	159	62	62	130	244	258
.....	2,140	1,070	2,860	4,600	2,860	356	139	93	50	111	217	181
.....	1,550	1,010	2,300	4,750	2,950	338	139	76	62	130	192	217
.....	1,340	980	2,100	4,900	2,820	338	120	76	56	120	244	192
.....	1,240	1,100	1,900	4,250	2,680	375	139	56	76	130	217	170
.....	1,200	.....	1,860	3,800	2,220	321	84	69	69	139	204	192
.....	1,200	.....	1,860	3,220	2,540	321	84	62	56	149	192	217
.....	1,070	.....	2,020	.....	2,900	.....	102	56	.....	149	.....	288

Daily discharge determined from a rating curve well defined between 60 and 3,500 second-feet.
harge June 15 to 24 estimated.

Monthly discharge of Mokelumne River near Clements, Cal., for 1910.

[Drainage area, 642 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
.....	3,600	830	1,340	2.09	2.41	82,400	A.
.....	1,160	800	947	1.48	1.54	52,600	A.
.....	6,110	1,480	2,390	3.72	4.29	147,000	B.
.....	4,900	1,940	3,240	5.05	5.63	193,000	B.
.....	4,900	2,100	3,180	4.95	5.71	196,000	B.
.....	3,000	321	1,000	1.56	1.74	59,500	A.
.....	273	84	172	.268	.31	10,600	B.
.....	120	25	64.4	.100	.12	3,960	B.
.....	181	45	74.2	.116	.13	4,420	B.
.....	149	62	107	.167	19	6,580	B.
.....	244	111	170	.265	.30	10,100	B.
.....	710	170	356	.555	.64	21,900	A.
year.....	6,110	25	1,090	1.70	23.01	788,000	

Discharge per square mile and run-off in inches are subject to error as some water is probably
ı the upper part of the basin to contiguous basins.

COSUMNES RIVER AT MICHIGAN BAR, CAL.

Cosumnes River rises on the western slope of the Sierra at an altitude of 7,700 feet, and flows southwestward to its junction with the Mokelumne, about 6 miles east of Walnut Grove. Its total length is about 90 miles. The main stream is formed by the confluence of its three forks, about 45 miles above its mouth and 20 miles above the valley border.

The gaging station, which is located at the Michigan Bar bridge, about 8 miles southwest of Latrobe and not far from the Michigan Bar post office, in the NW. ¼ SE. ¼ sec. 36, T. 8 N., R. 8 E., M. D. B. and M., was established October 29, 1907.

No tributaries enter below the station. Big Canyon Creek joins the main stream from the north about 6 miles above Michigan Bar, and the junction of the three forks is about 14 miles above.

Some water is diverted from the south side of the stream above the station and used for hydraulic mining near Michigan Bar. It is probable that all acquired water rights are for mining operations. Some water is also diverted from North Fork basin to the South Fork of American River.

The gage, the datum of which has not been changed since the station was established, is a vertical staff on the middle pier of the bridge.

Discharge measurements are made from the bridge.

The river bed is composed of sand and gravel and is subject to slight changes. At low stages the current is sluggish at the bridge. Very satisfactory measurements may be made at medium and high stages. No measurements have been made on the diversion ditch. The drainage area above the station is 524 square miles.

Discharge measurements of Cosumnes River at Michigan Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 18	J. E. Stewart	247	727	4.66	1,220
Mar. 11	do	248	738	4.82	1,410
25	do	248	973	5.64	2,820
May 24	do	208	466	3.65	270
July 2[a]	do	37	25	2.90	45
13[a]	do	35	18	2.71	26
Aug. 6[a]	W. V. Hardy	21	10	2.53	10
Oct. 26[a]	J. E. Stewart	29	16	2.68	18

[a] Measurement made by wading.

ly gage height, in feet, of Cosumnes River at Michigan Bar, Cal., for 1910.

[C. B. Ruman, observer.]

ıy.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	6.1	4.5	4.7	4.8	4.3	3.4	2.9	2.5	2.3	2.5	2.7	2.95
.....	5.1	4.5	4.7	4.8	4.2	3.4	2 9	2.5	2.3	2.5	2.7	2.9
.....	4.75	4.4	4.8	4.8	4.2	3.4	2.8	2.5	2.3	2.5	2.7	3.0
.....	4.55	4.4	4.8	4.75	4.2	3.35	2.85	2.5	2.3	2.5	2.7	3.75
.....	4.4	4.3	4.9	4.7	4.1	3.3	2.85	2.5	2.3	2.5	2.7	3.5
.....	4.4	4.2	4.85	4.7	4.1	3.3	2.85	2.5	2.35	2.5	2.7	3.3
.....	4.3	4.6	4.8	4.7	4.0	3.3	2.8	2.5	2.3	2.5	2.7	3.2
.....	4.2	4.55	4.8	4.7	4.0	3.3	2.8	2.5	2.3	2.5	2.7	3.2
.....	4.25	4.45	4.8	4.7	4.05	3.25	2.8	2.4	2.3	2.5	2.7	3.2
.....	4.2	4.4	4.8	4.7	4.05	3.2	2.75	2.4	2.3	2.55	2.8	3.2
.....	4.1	4.3	4.8	4.9	4.0	3.2	2.7	2.4	2.3	2.6	2.8	3.65
.....	4.1	4.3	4.8	4.75	4.0	3.2	2.7	2.4	2.4	2.75	2.8	3.8
.....	4.0	4.3	4.8	4.7	4.0	3.2	2.7	2.4	2.4	3.0	3.15	3.5
.....	4.7	4.35	4.8	4.65	4.0	3.15	2.7	2.4	2.4	2.9	3.05	3.4
.....	5.35	4.3	4.7	4.6	3.9	3.15	2.7	2.4	2.4	2.8	2.9	3.3
.....	5.5	4.3	4.7	4.6	3.85	3.2	2.7	2.4	2.5	2.7	2.9	3.2
.....	5.0	4.25	4.6	4.6	3.8	3.1	2.7	2.4	2.8	2.7	2.9	3.2
.....	4.6	4.2	4.7	4.65	3.8	3.1	2.6	2.4	2.9	2.7	2.9	3.1
.....	4.45	5.4	5.1	4.65	3.7	3.1	2.6	2.4	2.8	2.7	2.9	3.1
.....	4.35	4.8	6.9	4.65	3.7	3.1	2.6	2.4	2.7	2.7	3.0	3.05
.....	4.3	4.6	7.2	4.55	3.7	3.05	2.5	2.4	2.65	2.7	2.9	3.0
.....	4.4	4.65	6.65	4.5	3.7	3.0	2.5	2.4	2.6	2.7	2.9	3.0
.....	4.5	4.7	6.95	4.5	3.7	3.0	2.5	2.4	2.6	2.7	2.9	3.0
.....	6.0	4.6	5.95	4.4	3.65	3.0	2.5	2.4	2.65	2.7	2.9	3.0
.....	5.25	5.05	5.7	4.4	3.6	3.0	2.5	2.4	2.6	2.7	3.0	3.0
.....	4.95	4.8	5.4	4.4	3.6	3.0	2.5	2.4	2.55	2.7	3.35	3.0
.....	4.75	4.7	5.15	4.4	3.55	3.0	2.5	2.4	2.55	2.7	3.2	3.0
.....	4.65	4.7	5.05	4.4	3.5	2.9	2.5	2.4	2.5	2.65	3.0	3.0
.....	4.6	.....	4.95	4.45	3.5	2.9	2.5	2.4	2.5	2.65	3.0	2.95
.....	4.5	.....	4.8	4.3	3.5	2.9	2.5	2.35	2.5	2.7	3.0	2.95
.....	4.45	.....	4.8	.....	3.5	.....	.....	2.35	.....	2.7	.....	3.0

ly discharge, in second-feet, of Cosumnes River at Michigan Bar, Cal., for 1910.

ıy.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	3,950	995	1,250	1,400	770	160	46	8	2	8	22	54
.....	1,860	995	1,250	1,400	676	160	46	8	2	8	22	46
.....	1,320	880	1,400	1,400	676	160	32	8	2	8	22	63
.....	1,060	880	1,400	1,320	676	145	39	8	2	8	22	326
.....	880	770	1,550	1,250	588	130	39	8	2	8	22	196
.....	880	676	1,480	1,250	588	130	39	8	3	8	22	130
.....	770	1,120	1,400	1,250	504	130	32	8	2	8	22	104
.....	676	1,060	1,400	1,250	504	130	32	8	2	8	22	104
.....	723	938	1,400	1,250	546	117	32	4	2	8	22	104
.....	676	880	1,400	1,250	546	104	27	4	2	11	32	104
.....	588	770	1,400	1,550	504	104	22	4	2	14	32	266
.....	588	770	1,400	1,320	504	104	22	4	4	27	32	358
.....	504	770	1,440	1,250	504	104	22	4	4	63	93	196
.....	1,250	825	1,400	1,180	504	93	22	4	4	46	72	160
.....	2,280	770	1,250	1,120	428	93	22	4	4	32	46	130
.....	2,560	770	1,250	1,120	393	104	22	4	8	22	46	104
.....	1,700	723	1,120	1,120	358	82	22	4	32	22	46	104
.....	1,120	676	1,250	1,180	358	82	14	4	46	22	46	82
.....	938	2,370	1,860	1,180	293	82	14	4	32	22	46	82
.....	825	1,400	6,230	1,180	293	82	14	4	22	22	63	72
.....	770	1,120	7,200	1,060	293	72	8	4	18	22	46	63
.....	880	1,180	5,470	995	293	63	8	4	14	22	46	63
.....	995	1,250	6,390	995	293	63	8	4	14	22	46	63
.....	3,700	1,120	3,580	880	266	63	8	4	18	22	46	63
.....	2,100	1,780	2,980	880	240	63	8	4	14	22	63	63
.....	1,620	1,400	2,370	880	240	63	8	4	11	22	145	63
.....	1,320	1,250	1,940	880	218	63	8	4	11	22	104	63
.....	1,180	1,250	1,780	880	196	46	8	4	8	18	63	63
.....	1,120	.....	1,620	938	196	46	8	4	8	18	63	54
.....	995	.....	1,400	770	196	46	8	3	8	22	63	54
.....	938	.....	1,400	.....	196	.....	8	3	.....	22	.....	63

—Daily discharge determined from a rating curve well defined above 8 second-feet.

Monthly discharge of Cosumnes River at Michigan Bar, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	3,950	504	1,320	81,200	A.
February	2,370	676	1,050	58,300	A.
March	7,200	1,120	2,210	136,000	A.
April	1,550	770	1,150	68,400	A.
May	770	196	414	25,500	A.
June	160	46	96.1	5,720	A.
July	46	8	20.9	1,290	A.
August	8	3	5.0	307	B.
September	46	2	10.1	601	B.
October	63	8	19.6	1,210	A.
November	145	22	47.9	2,850	A.
December	358	46	112	6,890	A.
The year	7,200	2	536	388,000	

SACRAMENTO RIVER SYSTEM.

GENERAL FEATURES.

The mountain torrent that forms the head of Sacramento River issues from a small lake, unnamed on the map, lying 6,600 feet above sea level, on Mount Eddy, one of the peaks of the Trinity Mountains. About 8 miles east of this lake, or 12 miles following the course of the stream, it receives Wagon Valley Creek, which is fed by springs emerging from the lava beds at the southwest base of Mount Shasta, springs that are frequently referred to as the source of the Sacramento. About 370 miles south of its junction with Wagon Valley Creek the river unites with the San Joaquin and enters Suisun Bay, 50 miles from San Francisco.

The river is joined by numerous tributaries from the east and west. Those coming from the Sierra Nevada flow almost southwest; those from the Coast Range flow in a general easterly direction. The broad western slope of the Sierra furnishes by far the larger part of the drainage and all the important tributaries. Few of the streams from the Coast Range reach the Sacramento directly but become lost "in the intricate plexus of sloughs which meander through the tule lands bordering the main river. On the east, also, only the larger tributaries reach the Sacramento by a definite channel, and often that becomes exceedingly tortuous." [1]

Of the total fall of the river—6,600 feet from source to sea level—5,913 feet occurs in the 56 miles above the mouth of Pit River and 447 feet more in the 67 miles between Pit River and Red Bluff, leaving only 240 feet of fall for the remaining 250 miles of course.

Above the mouth of Pit River the Sacramento is a comparatively small stream, flowing swiftly in a well-defined channel; below the

[1] Ransome, F. L., The Great Valley of California: Bull. Univ. California, vol. 1, 1893-1896, p. 379.

Pit its magnitude increases, and at Red Bluff, where it enters Sacramento Valley, it becomes a sluggish stream, of small slope and small capacity. It is navigable to Red Bluff, 250 miles above its mouth.

Below the mouth of Stony Creek, for about 100 miles of its lower course, the Sacramento occupies a ridge 5 to 20 feet higher than the troughs of the nearly parallel flood basins on each side, which are 2 to 7 miles from the river. The channel capacity throughout this distance is less than one-third that necessary to carry ordinary floods. The levees that have been constructed to lessen or prevent overflow all fail at one or more places during extreme floods and some fail during ordinary floods. A large amount of water may thus pass from the river into the flood basins and be stored for a time, thus reducing the maximum rate of flow of the Sacramento and increasing the flood period.

The large overflow area on the west side of the Sacramento is divided into two basins—Colusa basin on the north and Yolo basin on the south—by a ridge of detritus brought down by Cache Creek. The flood area on the east side of the river is divided into four basins (called, from north to south, Butte, Sutter, American, and Sacramento) by Marysville Buttes and Feather and American rivers. The total area of these big flood basins is approximately 900 square miles and their combined storage capacity is equivalent to three days' continuous flood flow of all the streams discharging into the valley. When full these basins hold sufficient water to cover the entire valley to a depth of 1.38 feet.

SACRAMENTO RIVER AT CASTELLA, CAL.

This station, which is located at the private highway bridge at Castella, in sec. 22, T. 38 N., R. 4 W., M. D. B. and M., was established October 15, 1910. Castle Creek enters the river about one-half mile above the station.

The gage is a vertical staff on the downstream end of the right abutment of the private highway bridge from which discharge measurements are made.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement[1] was made by W. V. Hardy from the highway bridge:

October 8, 1910: Width, 75 feet; area, 106 square feet; discharge, 190 second-feet.

[1] Gage not in position when measurement was made.

Daily gage height, in feet, of Sacramento River at Castella, Cal., for 1910.

[H. O. Wickes, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		2.5	3.0	11		3.0	4.4	21	2.5	2.6	3.0
2		2.5	3.0	12		2.7	3.8	22	2.5	2.7	3.0
3		2.5	5.0	13		2.6	3.5	23	2.5	3.8	3.0
4		2.5	4.0	14		2.6	3.2	24	2.5	5.1	2.9
5		2.5	3.5	15	2.5	2.6	3.1	25	2.5	3.5	2.9
6		2.5	3.2	16	2.5	2.6	3.1	26	2.5	3.1	2.9
7		2.5	3.0	17	2.5	2.7	3.0	27	2.5	3.0	2.9
8		2.7	3.2	18	2.5	2.7	3.0	28	2.5	3.2	2.9
9		2.7	3.4	19	2.5	2.7	3.0	29	2.5	3.2	2.8
10		2.6	4.0	20	2.5	2.6	3.0	30	2.5	3.1	2.8
								31	2.5		2.7

SACRAMENTO RIVER AT ANTLER, CAL.

This station, which is located at the highway bridge at Antler, 200 feet above the mouth of Gregory Creek, in S. E. ¼ sec. 13, T. 35 N., R. 5 W., about 22 miles below the gaging station at Castella, was established November 19, 1910.

Middle Salt Creek enters the Sacramento about 2 miles above and Salt Creek about 3 miles below the station. Pit River, the main tributary of the upper Sacramento, enters about 14 miles below Antler.

The gage is a vertical staff on the downstream end of the pier at the right end of the bridge.

Discharge measurements are made from the bridge.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Sacramento River at Antler, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 18..	W. V. Hardy	115	310	(a)	266
Nov. 19..	Fred G. Wood	119	341	2.20	306

a Gage not installed.

Daily gage height, in feet, of Sacramento River at Antler, Cal., for 1910.

[C. H. Hamilton, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.1	11		4.6	21	2.3	2.6
2		3.4	12		4.7	22	2.5	2.5
3		6.7	13		4.6	23	3.1	2.3
4		5.5	14		3.7	24	4.65	2.4
5		3.9	15		3.5	25	3.7	2.6
6		3.5	16		3.5	26	3.0	2.6
7		3.2	17		3.0	27	2.4	2.6
8		3.7	18		3.0	28	2.5	2.6
9		4.6	19	2.2	3.0	29	3.0	2.5
10		4.6	20	2.15	2.8	30	3.2	2.5
						31		2.5

SACRAMENTO RIVER NEAR RED BLUFF, CAL.

This station, which was established January 28, 1902, to take the place of the gaging station maintained at Jellys Ferry since April 30, 1895, is located in lot 4, sec. 34, T. 28 N., R. 3 W., at the lower end of Iron Canyon, 4 miles above Red Bluff and about 3 miles, by river, below the proposed Iron Canyon dam site, at the location used for stream gaging by the State engineer in 1879, and by the commissioner of public works in 1893 to 1894. Discharge measurements were made in 1901 before the station was regularly established.

The river at this point is straight for 2 or 3 miles. The width between the banks at low water is about 500 feet. The depth of water at low stages averages 6 feet, with a maximum depth of 9 feet. The banks are steep and firm. The river flows in a bed of coarse gravel and cobblestones, with here and there small bowlders. The bedrock is lava.

Discharge measurements are made from a car and cable (830 feet span), 30 feet above the gage.

No important tributaries enter within several miles of the station, above or below. Antelope and Redbank creeks come in about 7 miles and Mill Creek about 16 miles below the station. Paines Creek enters about 3 miles and Battle and Cottonwood creeks about 10 miles above the station. Pit River enters about 40 miles above and Feather River about 100 miles below.

No diversions of any kind are made above the station, and it is believed that no appropriations of nor filings on water have been made.

The flow at the station is not affected by artificial storage.

The gage used by the commissioner of public works was still in place at the cable site and was used from January 28, 1902, the date upon which observations were begun, until December 31, 1903. A second gage was placed on the right bank, 3,200 feet below the cable, January 1, 1904, as no observer could be obtained to continue readings at the cable gage, and it was read until September 28, 1904. On this date the gage was removed to the left bank about 4,000 feet below the gaging station and read until February 12, 1906. Since February 14, 1906, the cable gage has been read. By synchronous readings of the lower gage with that at the cable, all readings have been reduced to equivalent readings for the cable gage. The datum of the cable gage which is read twice a day has remained unchanged.

The rating curve now in use is applicable since the station was established. The record is considered excellent.

Discharge measurements of Sacramento River near Red Bluff, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	J. E. Stewart	565	10,100	13.12	57,400
24	do	555	9,300	11.65	50,000
25	do	552	8,550	10.22	40,100
Mar. 18	do	531	6,070	5.60	18,700
July 7	do	500	3,860	1.58	5,590
Aug. 8	do	498	3,720	1.32	4,960
Sept. 14	W. V. Hardy	476	3,630	1.30	4,760
Oct. 5	do	485	3,700	1.40	5,000

Daily gage height, in feet, of Sacramento River near Red Bluff, Cal., for 1910.

[Richard Groebe, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.0	5.2	9.45	6.0	3.5	2.15	1.6	1.35	1.25	1.35	1.4	2.5
2	3.75	5.0	9.4	5.9	3.4	2.1	1.6	1.35	1.25	1.35	1.4	2.4
3	3.5	4.65	9.4	5.8	3.5	2.1	1.55	1.35	1.25	1.35	1.4	2.45
4	3.2	4.4	9.4	5.6	3.7	2.1	1.55	1.35	1.25	1.35	1.4	4.9
5	3.0	4.2	9.35	5.5	3.4	2.0	1.6	1.35	1.25	1.4	1.4	3.6
6	2.95	4.0	8.9	5.3	3.3	2.0	1.6	1.35	1.25	1.4	1.4	3.0
7	2.95	4.2	7.8	5.2	3.25	2.0	1.6	1.35	1.25	1.4	1.4	2.6
8	3.0	4.0	7.6	5.1	3.2	1.95	1.55	1.35	1.25	1.4	1.65	2.6
9	3.0	4.65	7.2	5.05	3.2	1.95	1.55	1.30	1.25	1.4	1.7	5.5
10	3.05	4.6	6.9	5.0	3.6	1.95	1.55	1.30	1.25	1.35	1.6	5.5
11	2.95	4.2	6.6	5.6	3.5	1.9	1.55	1.30	1.25	1.4	1.7	5.9
12	2.9	4.0	6.4	5.6	3.25	1.9	1.55	1.30	1.25	1.5	1.7	5.3
13	2.95	4.0	6.3	5.2	3.15	1.9	1.5	1.30	1.3	1.85	1.7	4.6
14	5.2	4.1	6.2	5.0	3.05	1.85	1.5	1.30	1.3	1.55	1.6	4.15
15	6.15	4.55	6.0	4.8	3.0	1.85	1.5	1.30	1.3	1.5	1.6	3.8
16	5.7	4.35	5.85	4.7	2.9	1.9	1.5	1.30	1.45	1.5	1.5	3.45
17	4.5	4.15	5.8	4.6	2.8	1.9	1.45	1.30	1.4	1.45	1.5	3.25
18	3.9	4.0	5.6	4.6	2.7	1.85	1.45	1.30	1.4	1.45	1.6	2.95
19	3.7	6.3	6.6	4.7	2.7	1.8	1.45	1.30	1.4	1.45	1.65	2.7
20	3.45	5.3	8.25	4.6	2.65	1.8	1.45	1.25	1.4	1.4	1.6	2.6
21	3.4	4.95	8.3	4.6	2.6	1.8	1.45	1.25	1.4	1.4	1.6	2.45
22	3.85	6.0	11.0	4.4	2.55	1.8	1.45	1.25	1.4	1.4	1.6	2.3
23	5.0	6.6	12.75	4.3	2.5	1.8	1.40	1.25	1.4	1.4	1.65	2.2
24	11.75	10.1	10.2	4.2	2.5	1.75	1.40	1.25	1.4	1.4	2.8	2.2
25	10.0	18.0	8.4	4.1	2.45	1.75	1.40	1.25	1.4	1.4	4.9	2.1
26	9.2	12.0	7.7	4.1	2.4	1.7	1.40	1.25	1.4	1.4	3.0	2.0
27	6.8	9.8	8.2	4.0	2.4	1.7	1.40	1.25	1.35	1.4	2.4	2.0
28	6.1	9.5	7.5	3.8	2.3	1.65	1.40	1.25	1.35	1.4	2.6	2.0
29	5.6	.....	6.9	3.7	2.3	1.65	1.40	1.25	1.35	1.4	3.0	1.95
30	5.4	.....	6.5	3.6	2.25	1.6	1.40	1.25	1.35	1.4	2.8	1.95
31	5.1	.....	6.2	.....	2.2	.....	1.40	1.25	.....	1.4	.....	1.95

Daily discharge, in second-feet, of Sacramento River near Red Bluff, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12,900	17,400	36,300	20,600	11,200	7,020	5,590	5,000	4,760	5,000	5,110	8,000
2	12,100	16,600	36,100	20,200	10,900	6,880	5,590	5,000	4,760	5,000	5,110	7,710
3	11,200	15,300	36,100	19,800	11,200	6,880	5,470	5,000	4,760	5,000	5,110	7,860
4	10,200	14,400	36,100	19,000	11,900	6,880	5,470	5,000	4,760	5,000	5,110	16,200
5	9,540	13,700	35,800	18,600	10,900	6,610	5,590	5,000	4,760	5,110	5,110	11,500
6	9,380	12,900	33,600	17,800	10,500	6,610	5,590	5,000	4,760	5,110	5,110	9,540
7	9,380	13,700	28,500	17,400	10,400	6,610	5,590	5,000	4,760	5,110	5,110	8,300
8	9,540	12,900	27,600	17,000	10,200	6,480	5,470	5,000	4,760	5,110	5,720	8,300
9	9,540	15,300	25,800	16,800	10,200	6,480	5,470	4,880	4,760	5,110	5,840	18,600
10	9,700	15,100	24,500	16,600	11,500	6,480	5,470	4,880	4,760	5,000	5,590	18,600
11	9,380	13,700	23,200	19,000	11,200	6,350	5,470	4,880	4,760	5,110	5,840	20,200
12	9,220	12,900	22,300	19,000	10,400	6,350	5,470	4,880	4,760	5,350	5,840	17,800
13	9,380	12,900	21,900	17,400	10,000	6,350	5,350	4,880	4,880	6,220	5,840	15,100
14	17,400	13,300	21,400	16,600	9,700	6,220	5,350	4,880	4,880	5,470	5,590	13,500
15	21,200	14,900	20,600	15,900	9,540	6,220	5,350	4,880	4,880	5,350	5,590	12,200

discharge, in second-feet, of Sacramento River near Red Bluff, Cal., for 1910—Con.

y.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Oct.
.....	19,400	14,200	20,000	15,500	9,220	6,350	5,350	4,880	5,230	5,350	5,350	11,000
.....	14,800	13,500	19,800	15,100	8,910	6,350	5,230	4,880	5,110	5,230	5,350	10,400
.....	12,600	12,900	19,000	15,100	8,600	6,200	5,230	4,880	5,110	5,230	5,590	9,380
.....	11,900	21,900	23,200	15,500	8,600	6,090	5,230	4,880	5,110	5,230	5,720	8,600
.....	11,000	17,800	30,600	15,100	8,450	6,090	5,230	4,760	5,110	5,110	5,590	8,300
.....	10,900	16,400	30,800	15,100	8,300	6,090	5,230	4,760	5,110	5,110	5,590	7,860
.....	12,900	20,600	44,200	14,400	8,150	6,090	5,230	4,760	5,110	5,110	5,590	7,430
.....	16,600	23,200	54,100	14,000	8,000	6,090	5,110	4,760	5,110	5,110	5,720	7,150
.....	48,300	39,500	40,000	13,700	8,000	5,960	5,110	4,760	5,110	5,110	8,910	7,150
.....	39,000	89,700	31,300	13,300	7,860	5,960	5,110	4,760	5,110	5,110	16,200	6,880
.....	35,100	49,700	28,000	13,300	7,710	5,840	5,110	4,760	5,110	5,110	9,540	6,610
.....	24,000	38,000	30,300	12,900	7,710	5,840	5,110	4,760	5,000	5,110	7,710	6,610
.....	21,000	36,600	27,200	12,200	7,430	5,720	5,110	4,760	5,000	5,110	8,300	6,610
.....	19,000	.....	24,500	11,900	7,430	5,720	5,110	4,760	5,000	5,110	9,540	6,480
.....	18,200	.....	22,700	11,500	7,290	5,590	5,110	4,760	5,000	5,110	8,910	6,480
.....	17,000	.....	21,400	.....	7,150	.....	5,110	4,760	.....	5,110	.....	6,480

E.—Daily discharge determined from a well-defined rating curve.

Monthly discharge of Sacramento River near Red Bluff, Cal., for 1910.

[Drainage area, 9,300 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
ry.....	48,300	9,220	16,200	1.74	2.01	996,000	A.
ary.....	89,700	12,900	21,800	2.34	2.44	1,210,000	A.
.....	54,100	19,000	28,900	3.11	3.58	1,780,000	A.
.....	20,600	11,500	16,000	1.72	1.92	952,000	A.
.....	11,900	7,150	9,310	1.00	1.15	572,000	A.
.....	7,020	5,590	6,280	.675	.75	374,000	A.
.....	5,590	5,110	5,320	.572	.66	327,000	A.
st.....	5,000	4,760	4,860	.523	.60	299,000	A.
mber.....	5,230	4,760	4,940	.531	.59	294,000	A.
ber.....	6,220	5,000	5,170	.556	.64	318,000	A.
mber.....	16,200	5,110	6,510	.700	.78	387,000	A.
nber.....	20,200	6,480	10,200	1.10	1.27	627,000	A.
The year.....	89,700	4,760	11,200	1.20	16.39	8,140,000	

PIT RIVER BASIN.

GENERAL FEATURES.

'it River drains an area in the northeastern part of California, ɛfly in Modoc, Lassen, and Shasta counties. The river is formed the union of its North and South forks. The South Fork rises he western slope of the Warner Mountains about halfway between rren and Eagle mountains, at an altitude of 8,000 feet above sea l, flows southwestward 10 miles, passing through Eagle Lake, ı westward about 10 miles, then turns abruptly and flows north- d through a swampy valley to Alturas, where it is joined by the th Fork, which rises about half a mile south of Goose Lake and s irregularly southward about 16 miles to the junction. The th of South Fork above the junction is about 36 miles, in which ance it falls 3,550 feet; 3,400 feet of this fall is made in the first miles.

Topographically the basin of the North Fork includes the area tributary to Goose Lake and is therefore larger than the basin of the South Fork. Goose Lake is an alkaline water body, 28 miles long and 10 miles in maximum width, lying about two-thirds in California and one-third in Oregon. It is fed by 16 streams in California with an aggregate drainage area of 250 square miles, by annual rainfall on the open surface of the lake (estimated at 14 inches), by 6 streams in Oregon, and probably also by subsurface springs. Normally the lake does not overflow, but for a short time in 1869 it sent a stream southward to the North Fork of the Pit, and it is reported to have overflowed to Pit River in 1881 for more than two hours during a severe storm from the north. The lower end of the lake is bordered by lava beds through which some water may be lost by percolation. Drews Creek, Cottonwood Creek, and Thomas Creek, the principal streams flowing into Goose Lake, drain the southeast slope of a high, timbered ridge near the southern corner of Lake County.

Below Alturas the Pit flows, in general, southwestward to its junction with the upper Sacramento about 12 miles north of Redding.

At Alturas the Pit is 4,500 feet above sea level; at its mouth it is 687 feet; the total fall below the fork is therefore 3,818 feet.

Below the forks the principal tributaries are McCloud River, Squaw Creek, and Fall River from the north, and Burney, Hat, Beaver, Ash, and West Valley creeks from the south. McCloud and Fall rivers are the largest, having a minimum flow of 1,200 to 1,500 second-feet. Hat and Burney creeks also have a minimum flow of several hundred second-feet.

PIT RIVER AT HENDERSON, CAL.

This station, which is located at the ferry, one-third mile above Henderson, in sec. 36, T. 37 N., R. 1 W., was established September 28, 1910.

Nelson Creek enters the river about 1 mile above the station, and Kosk Creek about 1 mile below.

The gage is a vertical staff attached to an alder on the left bank. Discharge measurements are made from a cable 95 feet below the gage.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Pit River at Henderson, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq.-ft.*	*Feet.*	*Sec.-ft.*
Sept. 28	Hardy and Stutt	147	1,020	0.97	2,91
Nov. 12[a]	F. G. Wood	149	1,040	1.04	3,23

[a] Full reliance should not be given to this measurement, as meter weight was too light for some of th high velocities encountered.

Daily gage height, in feet, of Pit River at Henderson, Cal., for 1910.

[T. F. Henderson, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		1.30	11		1.90	21	1.05	1.30
2		1.38	12		1.82	22	1.10	1.35
3		1.52	13		1.78	23	1.10	1.35
4		1.60	14		1.75	24	1.05	1.20
5		1.65	15	0.95	1.60	25	1.00	1.15
6		1.62	16	.95	1.30	26	1.12	
7		1.52	17	1.10	1.30	27	1.18	1.10
8		1.62	18	1.00	1.35	28	1.20	
9		1.70	19	1.00	1.35	29	1.22	
10		1.92	20	1.00	1.30	30	1.28	
						31		

PIT RIVER NEAR YDALPOM, CAL.

This station which is located at Silverthorne Ferry, in sec. 32, T. 34 N., R. 3 W., about 1¾ miles below Ydalpom, about 1 mile below the mouth of Squaw Creek, about 5 miles above the mouth of McCloud River, and 7 miles above the junction with the Sacramento, was established November 16, 1910. By combining these data with the record on the McCloud at Baird, the total flow of Pit River may be determined.

The gage is a vertical staff on an ash tree on the left bank near the ferry.

Discharge measurements are made from a boat a short distance above the ferry cable.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Pit River near Ydalpom, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 16	W. V. Hardy	213	1,810	(a)	3,010
Nov. 16	F. G. Wood	215	1,760	3.03	2,960

a Gage not installed.

Daily gage height, in feet, of Pit River near Ydalpom, Cal., for 1910.

[M. D. Rodrigue, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1		3.6	11		6.3	21	3.1	3.7
2		3.75	12		5.9	22	3.05	3.65
3		4.5	13		5.65	23	3.3	3.6
4		4.45	14		5.55	24	3.8	3.55
5		4.1	15		5.2	25	4.2	3.5
6		3.85	16	3.03	4.8	26	3.65	3.45
7		3.7	17	3.03	4.5	27	3.6	3.4
8		3.75	18	3.15	4.25	28	3.75	3.35
9		5.4	19	3.1	4.0	29	3.7	3.3
10		5.9	20	3.1	3.85	30	3.65	3.3
						31		3.3

GOOSE LAKE BASIN.

COTTONWOOD CREEK NEAR LAKEVIEW, OREGON.

Cottonwood Creek is tributary to Goose Lake. This station, which is located at a site for a storage dam in sec. 29, T. 38 S., R. 19 E., about 10 miles west of Lakeview, was established November 22, 1908. A dam at this site will store about 30,000 acre-feet of water and in connection with the proposed dam on Drews Creek will afford water sufficient to irrigate about 60,000 acres of land.

A 10-foot Cippoletti weir was installed at the dam site in November, 1908, and a gage was placed above it to measure the head. On January 19, 1909, the weir was lengthened to 15 feet, a footbridge was installed about 1,000 feet below it, and an inclined gage was set on the left bank. Measurements were made by a current meter from the bridge, as the weir had been so damaged by a flood that the abutments leaked. The damage was, however, repaired and comparative readings on both gages were made during most of 1909.

A small channel to the right of the measuring section carries water at high stages; both banks are wooded and are overflowed at flood times. The channel at the lower station is evidently permanent and a good discharge rating curve has been developed. As far as available the records derived from observations of the lower gage have been used in constructing the curve. The weir records used for the earlier period are somewhat uncertain, as the weir may have leaked.

The relation between gage height and discharge is affected by ice during extremely cold weather but evidently only for short periods, so that the accuracy of the determinations of the yearly run-off is not materially impaired.

The creek shows large, diurnal fluctuations during the spring, and, as the gage has been read only once or twice daily, the records for the spring season are subject to considerable error.

The station is maintained in cooperation with the Oregon Valley Land Co., which has furnished the weir data and gage heights.

Discharge measurements of Cottonwood Creek near Lakeview, Oreg., in 1909–10.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
May 7	R. B. Post	26	41	1.88	118
1910.					
May 17	L. R. Allen	20	17	.85	32
Sept. 28	Allen and Davenport	12	3.8	.15	2.1

Daily gage height, in feet, and discharge, in second-feet, of Cottonwood Creek at weir near Lakeview, Oreg., for 1908–9.

[O. W. Theis, observer.]

Day.	Nov., 1908.		Dec., 1908.		Jan., 1909.		Day.	Nov., 1908.		Dec., 1908.		Jan., 1909.	
	Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.		Gage height.	Discharge.	Gage height.	Discharge.	Gage height.	Discharge.
1			0.20	3.0	0.20	3.0	16			0.17	2.4	2.65	145
2			.19	2.8	.22	3.5	17			.17	2.4	2.35	133
3			.14	1.9	.32	6.1	18			.16	2.0	2.20	121
4			.19	2.8	.30	5.5	19			.15	2.0		
5			.24	4.1	.28	5.0	20			.15	2.0		
6			.25	4.2	.32	6.1	21			.16	2.0		
7			.20	3.0	.38	7.9	22	0.30	5.5	.17	2.4		
8			.22	3.6	.30	5.5	23	.29	5.2	.16	2.0		
9			.22	3.6	.30	5.5	24	.25	4.2	.16	2.0		
10			.22	3.2	.30	5.5	25	.24	3.9	.16	2.0		
11			.20	3.0	.26	4.5	26	.19	2.7	.19	2.7		
12			.26	4.2	.29	5.3	27	.20	3.0	.20	3.0		
13			.19	3.0	.30	5.5	28	.27	4.5	.20	3.0		
14			.16	2.2	.31	5.8	29	.21	3.3	.20	3.0		
15			.18	2.5	1.04	35.7	30	.22	3.6	.18	2.6		
							31			.20	3.0		

NOTE.—Crest of weir 10 feet long Nov. 22, 1908, to Jan. 16, 1909, and 11 feet long Jan. 17 to 18, 1909. As no allowance was made for probable leakage through weir, values may be somewhat too small.

Daily gage height, in feet, Cottonwood Creek near Lakeview, Oreg., for 1910.

[C. B. Melott, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	0.68	0.50		1.42	1.35	0.60	0.48	0.10	0.20	0.20	0.22	0.48
2	.45	1.00	2.60	1.48	1.32	.60	.42	.12	.20	.20	.25	.48
3	.60	1.60	2.45	1.50	1.35	.60	.40	.10	.18	.22	.28	1.12
4	.75	1.65	2.28	1.65	1.30	.55	.38	.10	.18	.25	.30	.75
5	.62	1.00	2.25	1.70	1.15	.50	.38	.12	.18	.22	.35	.78
6	.80	.80	2.00	1.42	1.10	.58	.38	.12	.20	.22	.30	.90
7	.75	.70	1.70	1.48	1.10	.55	.35	.12	.18	.22	.35	.80
8	.60	.65	1.52	1.50	1.08	.58	.35	.15	.20	.20	.32	1.60
9	.50	.55	1.50	1.65	1.10	.55	.35	.15	.20	.20	.30	1.20
10	.50	.55	1.85	1.72	1.08	.55	.35	.18	.20	.18	.30	1.52
11	.40	.52	1.85	1.62	1.05	.52	.30	.20	.18	.20	.32	1.54
12	.40	.55	1.95	1.78	1.02	.55	.25	.12	.18	.40	.38	1.58
13	.42	.62	2.10	1.65	1.02	.52	.25	.18	.18	.35	.35	1.50
14	.45		2.20	1.72	1.00	.52	.22	.15	.20	.32	.35	.92
15		.50		1.65	1.02	.55	.22	.18	.20	.28	.38	.80
16		.48	2.00	1.62	1.02	.55	.22	.18	.20	.28	.30	.70
17	.45	.48	2.10	1.72	1.05	.52	.22	.18	.20	.25	.28	.65
18	.42	.45	2.40	1.75	.98	.50	.22	.15	.22	.25	.32	.95
19	.45	.48	2.60	1.70	.92	.50	.20	.18	.25	.28	.25	.90
20	.32	.60	2.50	1.68	.88	.52	.20	.18	.28	.28	.28	.85
21	.35	.42	2.00	1.60	.80	.52	.20	.15	.28	.30	.28	.90
22	.95	.45	1.50	1.62	.75	.55	.18	.18	.25	.30	.25	.88
23	2.00	.48	1.55	1.65	.80	.52	.15	.15	.25	.30	.65	.62
24	1.80	.50	1.40	1.62	.78	.50	.15	.12	.25	.28	.75	.60
25	1.50	.50	1.30	1.65	.72	.50	.12	.18	.25	.28	.55	.60
26	1.30	.55	1.30	1.60	.72	.48	.12	.15	.25	.28	.42	.58
27	1.00	.55	1.28	1.68	.70	.48	.10	.18	.20	.28	.40	.55
28		1.45	1.20	1.45	.68	.45	.10	.15	.20	.25	.48	.55
29			1.22	1.40	.72	.42	.10	.20	.18	.25	.42	.52
30	.65		1.20	1.42	.68	.40	.10	.19	.20	.28	.50	.55
31	.55		1.18		.65		.10	.18		.20		.45

NOTE.—Relation between gage height and discharge affected by ice Feb. 5 to 6 and Nov. 15 to 16, 1909, probably during part of January and February, 1910, and for short periods at other times during 1909 and 1910.

Comparison with original records shows a few errors and several omissions in gage heights for 1909 published in Water-Supply Paper 270, p. 183. The following record is correct:

Feb. 3	0.55	July 10	0.60	Oct. 13–17	0.12
17	1.88	Sept. 5	.15	18	.15
23	1.00	26	.20	19–20	.20
Mar. 3	1.03	27	.20	21–22	.18
4	1.62	28–30	.22	23	.15
15	1.62	Oct. 12	.15	Nov. 4	3.00
31	1.87				

Daily discharge, in second-feet, of Cottonwood Creek near Lakeview, Oreg., for 1909–10

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	De
1909.												
1	.....	18	29	109	99	99	25	7	2	3	4	
2	.....	18	35	114	114	114	25	7	2	3	4	
3	.....	16	45	102	135	119	25	6	2	4	6	
4	.....	18	96	76	158	119	23	6	2	4	4	
5	.....	18	40	75	164	116	21	6	2	3	4	
6	.....	18	31	82	130	104	21	5	2	3	4	
7	.....	16	32	75	122	86	24	4	2	3	4	
8	.....	14	25	80	114	86	19	4	2	3	4	
9	.....	12	21	94	119	77	19	4	1	2	4	
10	.....	13	22	82	109	70	18	4	1	2	4	
11	.....	13	21	99	94	66	18	4	1	2	8	
12	.....	16	19	99	89	66	16	3	1	2	8	
13	.....	20	30	135	84	60	13	3	2	2	8	
14	.....	16	52	135	80	62	14	3	2	2	18	
15	.....	17	95	126	80	58	13	3	2	2	29	
16	.....	31	88	136	80	60	12	3	2	2	35	
17	.....	122	83	146	77	58	12	3	2	2	13	
18	.....	60	63	140	75	54	11	3	1	2	14	
19	196	52	54	124	73	64	11	3	1	3	24	
20	267	43	46	114	77	58	10	3	1	3	124	
21	286	27	46	106	75	50	9	2	1	3	135	
22	148	44	44	106	75	43	10	2	2	3	135	
23	96	43	37	102	73	42	9	2	2	2	337	
24	76	19	40	99	74	36	8	2	2	2	270	
25	56	18	47	106	75	35	9	2	3	2	94	
26	49	21	55	135	75	31	9	2	3	2	58	
27	50	21	58	144	94	30	8	2	3	2	43	
28	60	22	64	124	94	30	8	2	4	3	36	
29	99	.....	60	114	84	31	8	2	4	3	36	
30	84	.....	60	109	77	30	7	2	4	4	34	
31	43	.....	121	.....	75	.....	7	2	.....	4	.....	
1910.												
1	23	13	230	77	70	18	12	1	3	3	4	
2	11	43	210	82	68	18	10	2	3	3	4	
3	18	94	190	84	70	18	9	1	3	4	5	
4	27	99	168	99	66	16	8	1	3	4	6	
5	19	43	164	104	54	13	8	2	3	4	8	
6	30	30	135	77	50	17	8	2	3	4	6	
7	27	24	104	82	50	16	8	2	3	4	8	
8	18	21	86	84	49	17	8	2	3	3	7	
9	13	16	84	99	50	16	8	2	3	3	6	
10	13	16	119	106	49	16	8	3	3	3	6	
11	9	14	119	96	46	14	6	3	3	3	7	
12	9	16	130	112	44	16	4	2	3	9	8	
13	10	19	146	99	44	14	4	3	3	8	8	
14	11	16	158	106	43	14	4	2	3	7	8	
15	11	13	146	99	44	16	4	3	3	5	8	
16	11	12	135	96	44	16	4	3	3	5	6	
17	11	12	146	106	46	14	4	3	3	4	5	
18	10	11	183	109	42	13	4	2	3	4	7	
19	11	12	210	104	37	13	3	3	4	5	4	
20	7	13	196	102	35	14	3	3	5	5	5	
21	8	10	135	94	30	14	3	2	5	6	5	
22	40	11	84	96	27	16	3	3	4	6	4	
23	135	12	89	99	30	14	2	2	4	6	21	
24	114	13	75	96	29	13	2	2	4	5	27	
25	84	13	66	99	25	13	2	3	4	5	16	
26	66	16	66	94	25	12	2	2	4	5	10	
27	43	16	64	92	24	12	1	3	3	5	9	
28	36	80	58	80	23	11	1	2	3	4	12	
29	28	.....	60	75	25	10	1	3	3	4	10	
30	21	.....	58	77	23	9	1	3	3	5	13	
31	16	.....	56	.....	21	.....	1	3	.....	3	.....	

NOTE.—Daily discharge determined from discharge rating curve well defined between 2 and 130 second-feet. No correction made for ice.
Discharge Mar. 1, 1910, estimated by comparison with record for Drews Creek.

Monthly discharge of Cottonwood Creek near Lakeview, Oreg., for 1908–1910.

[Drainage area, 30 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1908.							
ber 22–30	5.5	2.7	3.99	0.133	0.04	71	C.
ber	4.2	1.9	2.76	.092	.11	170	C.
1909.							
y	286	3	65.1	2.17	2.50	4,000	C.
ıry	122	12	27.4	.913	.95	1,520	B.
	121	19	50.3	1.68	1.94	3,090	B.
	146	75	110	3.67	4.10	6,550	C.
	164	73	95.0	3.17	3.66	5,840	B.
	119	30	65.1	2.17	2.42	3,870	B.
	25	7	14.3	.477	.55	879	B.
	7	2	3.4	.113	.13	209	B.
ıber	4	1	2.1	.070	.08	125	C.
ır	4	2	2.6	.087	.10	160	B.
ıber	337	4	50.0	1.67	1.86	2,980	B.
ber	50	11	23.6	.787	.91	1,450	C.
The year	337	1	42.3	1.41	19.20	30,700	
1910.							
y	135	7	28.7	.957	1.10	1,760	C.
ıry	99	10	25.3	.843	.88	1,410	C.
	a 230	56	125	4.17	4.81	7,690	C.
	112	75	94.2	3.14	3.50	5,610	B.
	70	21	41.4	1.38	1.59	2,550	B.
	18	9	14.4	.480	.54	857	B.
	12	1	4.7	.157	.18	289	B.
	3	1	2.4	.080	.09	148	C.
ıber	5	3	3.3	.110	.12	196	B.
ır	9	3	4.6	.153	.18	283	B.
ıber	27	4	8.2	.273	.30	488	B.
ber	92	11	36.2	1.21	1.40	2,230	B.
The year	230	1	32.4	1.08	14.69	23,500	

a Estimated.

DREWS CREEK NEAR LAKEVIEW, OREGON.

rews Creek is tributary to Goose Lake. This station, which is ted at a highway bridge below the proposed dam site of the Oregon ey Land Co., about 23 miles west of Lakeview, in sec. 5, T. 40 S., 18 E., was established March 1, 1910. The point is below all ortant tributaries and is designated as station No. 3, as two other near by had previously been used. Station No. 1, located at the site, was established January 16, 1909. The gage was an inclined and discharge measurements were made from a footbridge by. This gage was read until May 31, 1909. Station No. 2 located at a dump-car bridge 100 feet below the dam site and was from November 20, 1909, to February 28, 1910, when it was ıdoned in favor of the present site, which affords conditions more rable for good results.

he gage is read twice daily and the readings indicate that the nal fluctuation is not strongly marked except at extreme high

stages. Some ice forms occasionally during the winter, but allowance has been made for its effect, and the accuracy of the record of total run-off is not impaired. The stream bed is usually dry for two or three months; no records have been obtained during the summer, for which period the discharge has been estimated.

Practically all records for this station have been collected by the Oregon Valley Land Co. Final computations have been made and the results prepared for publication by the engineers of the United States Geological Survey.

Discharge measurements of Drews Creek near Lakeview, Oreg., in 1909–10.

Station No. 1.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1909.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Feb. 15	J. G. Allen			0.98	162
16	....do			3.93	830
17	....do			3.55	717
18	....do			2.96	536
19	....do			1.37	213
21	....do			1.07	164
22	....do			1.14	180
26	....do			.68	100
28	R. F. Stripling			1.00	156
Mar. 3	....do			1.65	269
4	....do			2.60	433
6	....do			1.10	165
8	....do			1.10	167
9	....do			.66	108
14	....do			1.16	194
17	....do			2.90	547
22	....do			1.41	224
27	....do			1.80	312
29	....do			2.06	356
Apr. 1	....do			2.67	489
3	C. C. Gott			3.45	679
9	....do			2.77	516
10	R. F. Stripling			3.20	621
25	J. G. Allen			2.00	308
May 6	R. B. Post	49	104	1.40	230

Station No. 2.

1909.					
Nov. 23	C. W. Watson	52	261	9.00	1,110
24	W. J. Archer	44	174	7.00	706
26	....do	42	131	4.25	229
Dec. 9	....do	38	98	3.50	72
1910.					
Jan. 25	W. J. Archer	50	322	8.36	1,330

Station No. 3.

1910.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Mar. 21	W. J. Archer	62	221	5.00	692
30	....do	51	133	3.75	285
Apr. 7	....do	50	142	3.60	264
19	....do	49	117	3.10	150
25	....do	48	91	2.85	86
May 17[a]	L. R. Allen	30	26	2.25	25.8
17	W. J. Archer	43	62	2.26	28.5
Dec. 11	H. W. Frain	53	161	4.28	440
12	....do	51	130	3.58	270

[a] Measurement made by wading.

Daily gage height, in feet, of Drews Creek near Lakeview, Oreg., for 1909–10.

[Oregon Valley Land Co., observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Nov.	Dec.
1909.								
1	.....	0.9	1.45	2.7	1.6	.....	.....	4.4
2	.....	1.1	1.75	2.95	1.55	.....	.....	3.85
3	.....	1.35	1.95	3.3	1.6	.....	.....	3.55
4	.....	.95	2.6	2.55	1.55	.....	.....	3.15
5	.....	.6	1.45	2.2	1.55	.....	.....	.....
6	.....	.8	1.5	2.0	1.55	.....	.....	3.15
7	.....	.6	1.0	2.0	1.35	.....	.....	3.0
8	.....	.5	1.1	2.25	1.2	.....	.....	3.1
9	.....	.4	.5	2.75	1.2	.....	.....	3.4
10	.....	.45	.....	3.1	1.05	.....	.....	3.5
11	.....	.4	.....	2.85	1.0	.....	.....	4.5
12	.....	.5	.6	3.05	.9	.....	.....	4.45
13	.....	.8	.75	3.5	.85	.....	.....	4.5
14	.....	.85	1.25	3.5	.7	.....	.....	3.55
15	.....	1.0	1.75	3.5	.7	.....	.....	3.2
16	8.3	3.2	2.4	3.4	.65	.....	.....	3.1
17	6.5	3.9	2.65	3.5	.7	.....	.....	3.0
18	5.1	2.8	1.8	3.2	.55	.....	.....	2.95
19	5.2	1.5	1.8	3.1	.55	.....	.....	2.95
20	6.65	1.1	1.4	2.7	.4	.....	3.0	2.9
21	7.3	1.1	1.35	2.4	.55	.....	7.0	2.8
22	2.0	.7	1.4	2.2	.6	.....	7.0	2.8
23	3.05	1.05	1.35	2.1	.6	.....	9.0	2.65
24	2.45	1.0	1.4	1.95	.45	.....	7.0	.....
25	2.2	.8	1.35	2.0	.3	.....	5.15	.....
26	1.6	.75	1.45	2.05	.25	.....	4.3	2.75
27	1.25	.....	1.85	2.15	.5	.....	3.45	2.65
28	2.25	1.0	2.05	2.2	.7	.....	3.85	2.65
29	1.5	.....	2.05	1.9	.75	.....	.....	2.65
30	1.1	.....	1.5	1.8	.55	.....	4.1	2.7
31	.85	.....	2.0	.....	.45	.....	.....	2.9
1910.								
1	2.9	3.55	7.5	4.0	2.9	2.0	.....	.....
2	2.9	3.5	.....	.....	2.9	.....	.....	.....
3	2.9	3.5	6.8	.....	2.9	.....	.....	.....
4	2.8	3.4	5.55	3.8	3.0	.....	.....	.....
5	2.8	3.0	5.45	3.75	3.0	.....	.....	.....
6	2.7	3.0	4.9	3.75	2.9	1.8	.....	.....
7	2.6	3.0	4.85	3.7	2.75	.....	.....	.....
8	2.65	3.0	4.7	3.7	2.65	.....	.....	4.15
9	2.65	3.0	4.6	3.7	2.6	.....	.....	5.2
10	2.65	3.0	4.8	3.7	2.6	.....	.....	4.85
11	2.65	3.0	4.75	3.7	2.6	.....	.....	4.3
12	2.65	3.0	4.9	3.55	2.6	.....	.....	3.7
13	2.65	3.1	6.4	3.35	2.55	.....	.....	3.05
14	2.65	3.4	5.3	3.3	2.4	.....	.....	2.8
15	2.65	3.25	5.8	3.2	2.4	.....	.....	2.5
16	2.65	3.1	.....	3.2	2.3	.....	.....	2.4
17	2.65	3.1	5.6	3.2	2.25	.....	.....	2.0
18	2.65	3.1	5.6	3.15	2.25	.....	.....	.....
19	2.65	3.05	6.8	3.1	2.2	.....	.....	.....
20	2.65	3.0	5.4	3.1	2.2	.....	.....	.....
21	2.65	3.0	5.05	.....	2.2	.....	.....	.....
22	3.4	3.0	4.95	3.0	2.15	.....	.....	.....
23	4.4	3.0	4.85	2.95	2.1	.....	.....	.....
24	5.35	4.35	4.45	2.9	2.1	.....	.....	.....
25	8.9	4.6	4.2	2.85	2.1	.....	.....	.....
26	4.2	4.2	4.3	2.8	2.1	.....	.....	.....
27	3.65	4.0	4.0	2.8	2.05	.....	.....	.....
28	3.6	6.4	3.95	2.8	2.05	.....	.....	.....
29	.....	.....	3.8	2.9	.....	.....	.....	.....
30	3.65	.....	3.8	2.9	2.0	.....	.....	.....
31	3.65	.....	3.8	.....	2.0	.....	.....	.....

NOTE.—Gage heights observed at station No. 1 Jan. 16 to May 31, 1909; at station No. 2 Nov. 19, 1909, to Feb. 28, 1910, and at station No. 3 subsequent to that date.

For the greater part of the time readings were made twice a day. Only one reading Mar. 1 and 3, 1910, and none Mar. 2.

Creek dry from about Aug. 1 to Oct. 1, 1909, and July 1 to Oct. 1 1910.

Considerable ice noted Dec. 18–31, 1910; none reported at any other time.

Daily discharge, in second-feet, of Drews Creek near Lakeview, Oreg., for 1909–10.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Nov.	Dec.
1909.								
1	10	140	229	482	256	.....	.....	228
2	10	172	283	547	247	.....	.....	135
3	10	212	320	640	256	.....	.....	90
4	10	148	458	446	247	.....	.....	45
5	10	98	229	370	247	.....	.....	45
6	10	126	238	330	247	.....	.....	45
7	10	98	156	330	212	.....	.....	34
8	10	86	172	380	188	.....	.....	41
9	10	74	86	495	188	.....	.....	70
10	10	80	90	586	164	.....	.....	83
11	10	74	94	521	156	.....	.....	277
12	10	86	98	573	140	.....	.....	266
13	10	126	119	696	133	.....	.....	277
14	50	133	196	696	112	.....	.....	90
15	500	156	283	696	112	.....	.....	49
16	2,730	612	412	668	105	.....	.....	41
17	1,830	818	470	696	112	.....	.....	34
18	1,240	508	292	612	92	.....	.....	31
19	1,280	238	292	586	92	.....	.....	31
20	1,900	180	220	482	74	.....	34	28
21	2,230	172	212	412	92	.....	710	22
22	330	112	220	370	98	.....	710	22
23	573	156	212	350	98	.....	1,110	15
24	423	156	220	320	80	.....	710	16
25	370	133	212	330	62	.....	357	18
26	256	112	229	340	57	.....	211	20
27	196	134	301	360	86	.....	76	15
28	380	156	340	370	112	.....	135	15
29	238	.....	340	310	119	.....	156	15
30	172	.....	238	292	92	.....	177	17
31	133	.....	330	.....	80	.....	.....	28
1910.								
1	28	90	1,850	370	106	12	.....	10
2	28	83	1,680	351	106	.....	.....	20
3	28	83	1,500	333	106	.....	.....	30
4	22	70	910	314	124	.....	.....	50
5	22	34	870	300	124	.....	.....	70
6	17	34	656	300	106	5	.....	100
7	13	34	639	286	82	.....	.....	220
8	15	34	590	286	68	.....	.....	415
9	15	34	558	286	62	.....	.....	770
10	15	34	622	286	62	.....	.....	639
11	15	34	606	286	62	.....	.....	462
12	15	34	656	247	62	.....	.....	286
13	15	41	1,300	199	56	.....	.....	134
14	15	70	810	188	41	.....	.....	90
15	15	54	1,010	166	41	.....	.....	51
16	15	41	970	166	32	.....	.....	41
17	15	41	930	165	28	.....	.....	12
18	15	41	930	155	28	.....	.....	10
19	15	38	1,500	144	24	.....	.....	10
20	15	34	850	144	24	.....	.....	10
21	15	34	710	134	24	.....	.....	10
22	70	34	673	124	20	.....	.....	8
23	256	34	639	115	17	.....	.....	8
24	470	246	510	106	17	.....	.....	8
25	1,510	298	430	98	17	.....	.....	8
26	214	214	462	90	17	.....	.....	8
27	105	172	370	90	14	.....	.....	8
28	97	742	356	90	14	.....	.....	8
29	101	.....	314	106	13	.....	.....	8
30	105	.....	314	106	12	.....	.....	8
31	105	.....	314	.....	12	.....	.....	8

NOTE.—Daily discharge computed by engineers of United States Geological Survey chiefly from data furnished by the Oregon Valley Land Co. Discharge Jan. 1–15, 1909, estimated by a comparison with Cottonwood Creek records. Discharge Jan. 16–May 31, 1909 (station No. 1), determined from discharge rating curve well defined between 100 and 900 second-feet. Discharge Nov. 19 to Dec. 3, 1909 (station No. 2), determined from a curve fairly well defined between 500 and 1,200 second-feet; uncertain below 500 second-feet. Discharge Dec. 4, 1909, to Feb. 28, 1910 (station No. 2), obtained from a curve fairly well defined between 70 and 1,500 second-feet; approximate below 50 second-feet. Discharge Mar. 1 to Dec. 31, 1910 (except Dec. 1–7 and 18–31, which was estimated), (station No. 3) determined from a curve well defined below 1,200 second-feet. Discharge interpolated for other days on which the gage was not read.

Monthly discharge of Drews Creek near Lakeview, Oreg., for 1909–10.

[Drainage area, 211 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
1909.							
January	2,730	10	483	2.29	2.64	29,700	C.
February	818	74	189	.896	.93	10,500	B.
March	470	86	245	1.16	1.34	15,100	B.
April	696	292	476	2.26	2.52	28,300	B.
May	256	57	141	.668	.77	8,670	B.
June			45.0	.213	.24	2,680	
July		0	4.0	.019	.02	246	
August	0	0	0.0	.000	.00	0	
September	0	0	0.0	.000	.00	0	
October			2.0	.0095	.01	123	
November	1,110		148	.701	.78	8,810	C.
December	277	15	69.1	.327	.38	4,250	C.
The year	2,730	0	150	.711	9.63	108,000	
1910.							
January	1,510	15	110	0.521	.60	6,760	D.
February	742	34	97.6	.463	.48	5,420	C.
March	1,850	314	791	3.75	4.32	48,600	C.
April	370	90	201	.953	1.06	12,000	B.
May	124	12	49.1	.233	.27	3,020	B.
June	12	0	4.1	.019	.02	244	
July	0	0	0.0	.000	.00	0	
August	0	0	0.0	.000	.00	0	
September	0	0	0.0	.000	.00	0	
October			5.0	.024	.03	307	
November			10.0	.047	.05	595	
December	770		113	.536	.62	6,950	C.
The year	1,850	0	116	.550	7.45	83,900	

NOTE.—Monthly means for low-water periods estimated by comparison with Cottonwood Creek records. They are only approximate, but do not introduce any appreciable error in the yearly total.

HAT CREEK AT HAT CREEK, CAL.

This station, which is located at the highway bridge in the SE. ¼ sec. 10, T. 34 N., R. 4 E., about 300 yards north of Hat Creek post office, was established September 22, 1910.

The gage is a vertical staff fastened to the right abutment near the downstream end of the bridge.

Discharge measurements are made from the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Hat Creek at Hat Creek, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 21	W. V. Hardy	17	44	(a)	136
Nov. 11	F. G. Wood	18	43	2.43	154

a No gage installed.

Daily gage height, in feet, of Hat Creek at Hat Creek, Cal., for 1910.

[Fred Seaborn, observer.]

Day.	Sept.	Oct.	Nov.	Dec.	Day.	Sept.	Oct.	Nov.	Dec.
1				2.45	16				2.49
2					17				2.47
3			2.41	2.55	18				
4					19			2.41	2.42
5			2.41		20			2.41	2.42
6				2.46	21				
7					22	2.05			
8				2.52	23				
9			2.42		24				2.47
10				2.80	25			2.47	
11			2.45		26			2.45	
12			2.44		27				2.49
13					28		2.55	2.44	2.41
14					29		2.42	2.42	2.43
15			2.42	2.50	30		2.42	2.43	
					31				2.43

KOSK CREEK NEAR HENDERSON, CAL.

This station, which is located in sec. 12, T. 37 N., R. 1 W., at the bridge on E. J. Holm's ranch, 1 mile northwest of forest ranger's camp, about one-fourth mile above the mouth of Baker Creek, and about 3½ miles above the mouth of Kosk Creek, was established October 1, 1910.

The gage is a vertical staff on an alder tree on the left bank.

Discharge measurements are made from the bridge 100 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Kosk Creek near Henderson, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 27[a]	W. V. Hardy	13	18	(b)	28
Nov. 13	F. G. Wood	15	21	2.96	34

a Made from temporary footbridge one-fifth mile above ranger's cabin. Permanent bridge now building
b Gage not installed.

Daily gage height, in feet, of Kosk Creek near Henderson, Cal., for 1910.

[Harry R. Powers, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	2.88			11	2.98			21	2.91		
2				12	3.02			22	2.92		
3	2.90		5.20	13	3.00	2.96		23		3.80	3.42
4	2.94		4.00	14				24	2.92	4.28	
5	2.92	2.91		15	2.93			25	2.92	3.90	
6	2.91		3.60	16	2.92			26	2.92		
7	2.90	2.91		17	2.92			27	2.92		3.35
8		2.91	4.05	18	2.92			28	2.91		
9	2.90	3.00		19	2.91			29			
10	2.90	2.99		20			3.50	30	2.91	3.45	
								31	2.91		

McCLOUD RIVER AT BAIRD, CAL.

This station, which is located at the United States fishery at Baird, in the NW. ¼ sec. 23, T. 34 N., R. 4 W., about 2,000 feet below the mouth of Bailey Creek and about 2,000 feet above the mouth of Johns Creek, and about 2 miles above the mouth of the McCloud, was established December 22, 1910.

The discharge at this station plus the discharge of Pit River at Silverthorne Ferry, represents the discharge of Pit River at its mouth.

The gage is a vertical staff fastened to an alder tree on the right bank about 600 feet above the hatchery.

Discharge measurements are made from a boat about 100 feet below the gage.

Discharge measurements of McCloud River at Baird, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 17[a]	W. V. Hardy	100	244	(b)	1,100
Dec. 22[c]	F. G. Wood	150	696	2.13	1,320

[a] Made from railroad bridge above junction with Pit River.
[b] No gage installed.
[c] Made from boat 100 feet below gage.

Daily gage height, in feet, of McCloud River at Baird, Cal., for 1910.

[G. H. Lambson, observer.]

December 22	2.13
23	2.13
24	2.10
25	2.05
26	2.03
27	2.01
28	2.00
29	2.00
30	2.00
31	1.98

COTTONWOOD CREEK BASIN.

NORTH FORK OF COTTONWOOD CREEK AT ONO, CAL.

Cottonwood Creek is formed by the junction of its North and Middle forks, of which Middle Fork may be considered the continuation of the main stream. Middle Fork rises on the eastern slope of Trinity Mountains in the southeastern part of T. 30 N., R. 10 W., and winds eastward; it is about 30 miles long and drains an area comprising 261 square miles. North Fork rises on the eastern slope of Bully Choop Mountain and flows very irregularly southeastward to its junction with Middle Fork, a short distance below Gas Point; it is about 20 miles long and drains an area 112 square miles in extent. Below the junction the main creek flows eastward and joins the Sacramento about 5 miles east of the town of Cottonwood opposite the mouth of Battle Creek. The principal tributary below the junction is the South Fork, which in turn receives the Cold Fork. The total area drained by Cottonwood Creek is 929 square miles.

A gaging station was established October 27, 1907, on the North Fork near the center of sec. 11, T. 30 N., R. 7 W., at the highway bridge one-fourth mile west of Ono, a short distance below the mouth of Byron Creek and about 1 mile above the mouth of Eagle Creek.

The gage, the datum of which has not been changed since the station was established, is a vertical staff fastened to the left face of the middle pier of the bridge.

The channel is rather rough and subject to slight change.

At high stages the current is swift and is somewhat obstructed by the center bridge pier. Discharge measurements are made from the bridge.

Several small ditches divert water from the creek above the gaging station. In September, 1908, these ditches carried 14 second-feet. Acquired water rights greatly exceed the low-water flow of the creek.

The 1910 discharge rating curve is fairly well defined and represents an average of all the measurements that have been made since the station was established. The records may be considered very good.

Discharge measurements of North Fork of Cottonwood Creek at Ono, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
n. 26	J. E. Stewart	74	108	5.57	242
ar. 19	do	75	110	5.54	245
ly 8 [a]	do	26.6	24	4.45	14
ug. 9 [a]	do	24	16	4.12	3.8
ec. 20 [a]	H. D. McGlashan	43	42	4.81	47

[a] Measurement made by wading.

Daily gage height, in feet, of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

[F. J. Wheelock, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.0	5.3	5.7	5.65	5.2	4.75	4.5	4.2	4.1	4.25	4.5	4.8
2	5.0	5.3	5.7	5.6	5.2	4.8	4.5	4.2	4.1	4.25	4.5	4.8
3	4.95	5.3	5.7	5.6	5.2	4.8	4.5	4.2	4.1	4.3	4.5	5.0
4	4.95	5.25	5.7	5.6	5.2	4.7	4.5	4.2	4.1	4.3	4.5	5.0
5	4.95	5.2	5.65	5.55	5.2	4.65	4.5	4.2	4.15	4.3	4.5	4.9
6	4.9	5.2	5.6	5.55	5.15	4.7	4.5	4.15	4.15	4.3	4.5	4.85
7	4.9	5.2	5.6	5.5	5.15	4.7	4.45	4.15	4.15	4.3	4.5	4.8
8	4.9	5.2	5.55	5.5	5.15	4.7	4.45	4.1	4.15	4.3	4.65	5.15
9	4.9	5.4	5.55	5.5	5.15	4.7	4.4	4.1	4.15	4.3	4.6	5.0
10	4.9	5.3	5.5	5.5	5.15	4.7	4.4	4.15	4.15	4.3	4.55	5.3
11	4.9	5.25	5.5	5.65	5.1	4.7	4.5	4.15	4.15	4.65	4.55	5.2
12	4.9	5.25	5.5	5.5	5.1	4.7	4.4	4.15	4.2	5.45	4.55	5.1
13	5.0	5.25	5.5	5.5	5.05	4.7	4.35	4.15	4.2	4.95	4.55	5.0
14	5.0	5.25	5.5	5.5	5.05	4.7	4.35	4.15	4.2	4.75	4.55	4.95
15	5.1	5.2	5.5	5.45	5.05	4.7	4.35	4.15	4.25	4.7	4.55	4.9
16	5.0	5.2	5.5	5.45	5.0	4.7	4.35	4.15	4.25	4.65	4.55	4.9
17	5.0	5.2	5.45	5.45	5.0	4.7	4.3	4.15	4.25	4.6	4.55	4.9
18	4.95	5.25	5.4	5.4	5.0	4.7	4.3	4.2	4.25	4.6	4.6	4.85
19	4.95	5.25	5.5	5.4	5.0	4.7	4.3	4.2	4.3	4.6	4.55	4.85
20	4.95	5.25	5.7	5.4	5.0	4.6	4.3	4.2	4.3	4.6	4.55	4.8
21	5.05	5.2	6.05	5.4	4.95	4.6	4.3	4.2	4.3	4.55	4.55	4.8
22	5.1	5.6	6.75	5.35	4.95	4.6	4.25	4.2	4.3	4.55	4.55	4.8
23	5.6	5.45	6.1	5.35	4.95	4.6	4.2	4.1	4.3	4.55	4.7	4.8
24	5.9	6.6	5.95	5.3	4.95	4.6	4.2	4.1	4.3	4.55	4.9	4.75
25	5.65	5.9	5.8	5.3	4.95	4.5	4.25	4.1	4.3	4.55	4.8	4.75
26	5.6	5.75	6.2	5.3	4.95	4.5	4.3	4.1	4.3	4.55	4.7	4.75
27	5.5	5.7	5.9	5.3	4.9	4.5	4.25	4.15	4.3	4.55	5.0	4.75
28	5.4	5.7	5.8	5.25	4.9	4.5	4.2	4.15	4.3	4.55	4.85	4.75
29	5.4	.....	5.7	5.25	4.85	4.5	4.2	4.1	4.25	4.5	4.8	4.7
30	5.4	.....	5.7	5.2	4.8	4.5	4.2	4.1	4.25	4.5	4.8	4.7
31	5.4	.....	5.7	.....	4.8	.....	4.2	4.1	.....	4.5	.....	4.7

Daily discharge, in second-feet, of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	90	175	349	324	143	43	17	5	3.5	6.5	17	90
2	90	175	349	298	143	50	17	5	3.5	6.5	17	59
3	79	175	349	298	143	50	17	5	3.5	8	17	90
4	79	159	349	298	143	36	17	5	3.5	8	17	90
5	79	143	324	275	143	30	17	5	4.2	8	17	68
6	68	143	298	275	129	36	17	4.2	4.2	8	17	59
7	68	143	298	252	129	36	14	4.2	4.2	8	17	50
8	68	143	275	252	129	36	14	3.5	4.2	8	30	129
9	68	211	275	252	129	36	12	3.5	4.2	8	25	90
10	68	175	252	252	129	36	12	4.2	4.2	8	21	175
11	68	159	252	324	115	36	17	4.2	4.2	30	21	143
12	68	159	252	252	115	36	12	4.2	5	232	21	115
13	90	159	252	252	102	36	10	4.2	5	79	21	90
14	90	159	252	252	102	36	10	4.2	5	43	21	79
15	115	143	252	232	102	36	10	4.2	6.5	36	21	79
16	90	143	252	232	90	36	10	4.2	6.5	30	21	79
17	90	143	232	232	90	36	8	4.2	6.5	25	21	79
18	79	159	211	211	90	36	8	5	6.5	25	25	59
19	79	159	252	211	90	36	8	5	8	25	21	59
20	79	159	349	211	90	25	8	5	8	25	21	50
21	102	143	572	211	79	25	8	5	8	21	21	50
22	115	298	1,230	193	79	25	6.5	5	8	21	21	50
23	298	232	609	193	79	25	5	3.5	8	21	36	50
24	467	1,060	501	175	79	25	5	3.5	8	21	68	43
25	324	467	405	175	79	17	6.5	3.5	8	21	50	43
26	298	377	689	175	79	17	8	3.5	8	21	36	43
27	252	349	467	175	68	17	6.5	4.2	8	21	90	43
28	211	349	405	159	68	17	5	4.2	8	21	59	43
29	211	.....	349	159	59	17	5	3.5	6.5	17	50	36
30	211	.....	349	143	50	17	5	3.5	6.5	17	50	36
31	211	.....	349	.....	50	.....	5	3.5	.....	17	.....	36

NOTE.—Daily discharge determined from a rating curve well defined below and fairly well defined above 500 second-feet.

Monthly discharge of North Fork of Cottonwood Creek at Ono, Cal., for 1910.

[Drainage area, 52 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	467	68	139	2.67	3.08	8,550	A.
February	1,060	143	231	4.45	4.63	12,800	A.
March	1,230	211	374	7.20	8.30	23,000	B.
April	324	143	231	4.45	4.96	13,700	A.
May	143	50	105	2.02	2.33	6,460	A.
June	50	17	32	.615	.69	1,900	A.
July	17	5	10.3	.198	.23	633	B.
August	5	3.5	4.26	.082	.09	262	B.
September	8	3.5	5.91	.114	.12	352	B.
October	232	6.5	27.3	.525	.60	1,680	B.
November	90	17	29.7	.571	.64	1,770	A.
December	175	36	69.6	1.34	1.54	4,280	A.
The year	1,230	3.5	102	1.96	27.21	75,400	

MILL CREEK BASIN.

MILL CREEK NEAR LOS MOLINOS, CAL.

Mill Creek rises in Shasta County just south of Lassen Peak, at an altitude of about 8,000 feet above sea level, and flows in a general southwesterly direction to its junction with Sacramento River, 1½ miles above Los Molinos.

The drainage basin lies west of Sacramento River and between the drainage basins of Antelope and Deep creeks.

The gaging was established September 28, 1909, by the Los Molinos Land Co., by which it is maintained. It is located one-fourth mile east of the company's dam, one-fourth mile west of the northeast corner of sec. 1, T. 25 N., R. 2 W., 4½ miles northeast of Los Molinos, and 5 miles east of Tehama, Cal.

No water is diverted from the creek above the station. At the dam below the station water is diverted by the company for use on its project in the vicinity of Los Molinos.

The gage is an inclined staff on the right bank. Only an occasional gage height has been obtained at this station as no regular observer is available.

The channel, which is composed of cemented gravel, is practically permanent. The current is swift at medium and high stages. Both banks are high and will not overflow.

Discharge measurements are made from the foot-bridge near the gage.

Discharge measurements of Mill Creek near Los Molinos, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 23	J. E. Stewart	48	139	1.98	460
Mar. 17	do	53	140	1.92	479
May 24	W. B. Clapp	49	139	1.70	404
July 6	J. E. Stewart	44	93	.86	162
Aug. 6	do	43	84	.65	125
Sept. 13	W. V. Hardy	38	84	.63	119

NOTE.—These measurements were made by engineers of the United States Geological Survey.

Gage height of Mill Creek near Los Molinos, Cal., for 1910.

	Feet.		Feet.
Feb. 23	1.80	Aug. 20	0.65
June 25	.90	30	.63
July 1	.90	Sept. 10	.63
9	.87	Oct. 1	.63
10	.87	Dec. 16	1.10
25	.73	30	.79
30	.70		

NOTE.—These gage heights were observed by employees of the Los Molinos Land Co.

STONY CREEK BASIN.

GENERAL FEATURES.

Stony Creek drains an area comprising 828 square miles, lying on the eastern slope of the Coast Range, north of the Cache Creek drainage basin, and south of the Thomes Creek basin, which lies between it and the Cottonwood basin on the north. Of this area about 600 square miles is embraced in an irregular parallelogram which is 10 to 15 miles wide and touches the crest of the range for a distance of 50 or 60 miles. The creek rises in the south end of this

area and flows northward along its eastern border for a distance of about 35 miles, then westward for about 15 miles, and finally southeastward to its junction with the Sacramento near St. John. The total length of the creek is about 90 miles, and its fall about 4,000 or 5,000 feet.

The principal tributaries of Stony Creek are Little Stony Creek from the south end of the area, Briscoe Creek from its middle, Grindstone Creek from its north end; and North Fork, which enters the main creek about 10 miles northwest of Orland.

STONY CREEK NEAR FRUTO, CAL.

This station, which is located at Julian's ranch, in the SW. ¼ NE. ¼ sec. 14, T. 21 N., R. 6 W., about 7 miles northeast of Fruto and 1¾ miles above the proposed mill dam site, was established January 30, 1901.

The only inportant tributary near the gaging station is Grindstone Creek, which drains an area of 173 square miles and enters from the west a short distance above the station. Salt, Elk, and Briscoe creeks enter the creek some distance above the station from the south. North Fork of Stony Creek, which has a drainage area of about 90 square miles, enters about 12 miles below.

The gage, the datum of which has not been changed since the station was established, is in two sections on the left bank and is read daily, with occasional extra readings during flood periods. The high-water portion is a vertical staff set in a rock excavation about 200 feet above the cable. A sloping auxiliary staff gage, bolted to rock, is read at low stages.

Discharge measurements are made from a car and cable.

The channel is composed of gravel which shifts more or less during high water, when the current is very swift and the stream is several hundred feet wide. The creek is not liable to overflow until it reaches the 15-foot stage on the gage.

The 1910 rating curve is fairly well defined for medium and low stages, but poorly defined for high water. The records are fair.

Discharge measurements of Stony Creek near Fruto, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 25	T. C. Johnson	140	356	6.72	1,460
28	J. E. Stewart	136	246	5.92	968
Mar. 22	T. C. Johnson	167	691	8.6	5,050
23	do	160	566	7.6	3,110
June 13	do	150	62	4.2	53
14	do	150	62	4.2	52
30	do	32	20	4.0	26
July 6	do	37	19	4.0	24
20	do	20	8.5	3.85	4.9
27	do	20	6.9	3.85	4.2

NOTE.—All measurements except that of Jan. 28 were made by the United States Reclamation Service.

Daily gage height, in feet, of Stony Creek near Fruto, Cal., for 1910.

[Lee Julian, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5.5	5.7	6.5	6.4	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.4
2	5.5	5.6	6.4	6.2	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.4
3	5.6	5.5	6.4	6.0	5.1	4.5	4.0	3.7	3.6	3.8	3.9	4.8
4	5.6	5.4	6.3	6.0	5.0	4.5	4.1	3.7	3.6	3.8	3.9	5.1
5	5.5	5.3	6.3	5.9	5.0	4.4	4.1	3.7	3.7	3.8	3.9	5.2
6	5.4	5.3	6.2	5.8	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
7	5.3	5.7	6.2	5.7	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
8	5.2	5.7	6.2	5.6	5.0	4.4	4.0	3.7	3.7	3.8	3.9	5.3
9	5.2	5.6	6.1	5.6	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.3
10	5.3	5.7	6.1	5.6	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.4
11	5.4	5.5	6.0	5.8	5.0	4.4	4.0	3.7	3.7	3.9	3.9	5.5
12	5.4	5.4	6.0	5.8	5.0	4.3	3.9	3.7	3.7	3.9	3.9	5.5
13	5.5	5.3	6.0	5.8	5.0	4.3	3.9	3.7	3.7	3.9	4.0	5.4
14	5.6	5.2	6.0	5,7	5.0	4.3	3.9	3.7	3.7	3.9	4.0	5.4
15	5.8	5.2	5.9	5.7	4.9	4.3	3.8	3.7	3.7	3.9	4.0	5.3
16	5.8	5.2	5.8	5.7	4.9	4.3	3.8	3.7	3.8	3.9	4.0	5.3
17	5.7	5.1	5.7	5.6	4.8	4.3	3.8	3.7	3.8	3.9	4.0	5.3
18	5.6	5.1	5.7	5.6	4.8	4.3	3.8	3.7	3.8	3.9	4.0	5.2
19	5.5	6.1	5.7	5.5	4.7	4.2	3.8	3.7	3.8	3.9	4.0	5.2
20	5.4	6.0	6.4	5.5	4.7	4.2	3.8	3.7	3.8	3.9	4.0	5.1
21	5.4	6.0	10.5	5.5	4.7	4.1	3.8	3.6	3.8	3.9	4.1	5.0
22	5.75	5.9	8.85	5.5	4.6	4.1	3.8	3.6	3.8	3.9	4.1	4.9
23	6.25	6.2	7.6	5.4	4.6	4.1	3.8	3.6	3.8	3.9	4.1	4.8
24	8.25	7.5	7.0	5.4	4.6	4.0	3.7	3.6	3.8	3.9	4.2	4.7
25	7.5	7.3	6.7	5.3	4.6	4.0	3.7	3.6	3.8	3.9	4.8	4.7
26	7.0	7.0	6.5	5.3	4.6	4.0	3.7	3.6	3.8	3.9	4.7	4.7
27	6.7	6.8	8.15	5.3	4.6	4.4	3.7	3.6	3.8	3.9	4.6	4.6
28	6.1	6.5	7.6	5.2	4.6	4.4	3.7	3.6	3.8	3.9	4.5	4.6
29	5.9	.....	7.2	5.2	4.5	4.3	3.7	3.6	3.8	3.9	4.5	4.6
30	5.8	.....	6.8	5.2	4.5	4.1	3.7	3.6	3.8	3.9	4.5	4.5
31	5.8	.....	6.5	.....	4.5	.....	3.7	3.6	.....	3.9	.....	4.5

Daily discharge, in second-feet, of Stony Creek near Fruto, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	480	775	1,580	1,460	370	118	23	1	0.5	2	11	93
2	480	695	1,460	1,220	370	118	23	1	.5	2	11	93
3	540	620	1,460	1,030	370	118	23	1	.5	2	11	220
4	540	550	1,340	1,030	315	118	38	1	.5	2	11	370
5	480	485	1,340	940	315	93	38	1	1	2	11	425
6	425	485	1,220	855	315	93	23	1	1	2	11	485
7	370	775	1,220	775	315	93	23	1	1	2	11	485
8	320	775	1,220	695	315	93	23	1	1	2	11	485
9	320	695	1,120	695	315	93	23	1	1	11	11	485
10	370	775	1,120	695	315	93	23	1	1	11	11	550
11	425	620	1,030	855	315	93	23	1	1	11	11	620
12	425	550	1,030	855	315	72	11	1	1	11	11	620
13	480	485	1,030	855	315	72	11	1	1	11	23	550
14	540	425	1,030	775	315	72	11	1	1	11	23	550
15	690	425	940	775	265	72	2	1	1	11	23	485
16	690	425	855.	775	265	72	2	1	2	11	23	485
17	610	370	775	695	220	72	2	1	2	11	23	485
18	540	370	775	695	220	72	2	1	2	11	23	425
19	480	1,120	775	620	180	54	2	1	2	11	23	425
20	425	1,030	1,460	620	180	54	2	1	2	11	23	370
21	425	1,030	9,010	620	180	38	2	.5	2	11	38	315
22	650	940	5,360	620	145	38	2	.5	2	11	38	265
23	1,120	1,220	3,120	550	145	38	2	.5	2	11	38	220
24	3,840	2,960	2,210	550	145	23	1	.5	2	11	54	180
25	2,750	2,640	1,830	485	145	23	1	.5	2	11	220	180
26	2,100	2,210	1,580	485	145	23	1	.5	2	11	180	180
27	1,750	1,960	4,050	485	145	93	1	.5	2	11	145	145
28	1,120	1,580	3,120	425	145	93	1	.5	2	11	118	145
29	940	.....	2,490	425	118	72	1	.5	2	11	118	145
30	855	.....	1,960	425	118	38	1	.5	2	11	118	118
31	855	.....	1,580	.....	118	.....	1	.5	.....	11	.....	118

NOTE.—Daily discharge determined from rating curves applicable as follows: January 1–25, not well defined; January 25–27, by indirect method for shifting channels; January 28–December 31, fairly well defined; discharge June 27–29 increased by water from East Park reservoir.

Monthly discharge of Stony Creek near Fruto, Cal., for 1910.

[Drainage area, 601 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	3,840	320	840	1.40	1.61	51,600	C.
February	2,960	370	964	1.60	1.67	53,500	C.
March	9,010	775	1,910	3.18	3.67	117,000	C.
April	1,460	425	733	1.22	1.36	43,600	B.
May	370	118	240	.399	.46	14,800	B.
June	118	23	73.8	.123	.14	4,390	B.
July	38	1	11.0	.018	.02	676	D.
August	1	.5	.82	.0014	.002	50	D.
September	2	.5	1.43	.0024	.003	85	D.
October	11	2	8.68	.014	.02	534	D.
November	220	11	46.1	.077	.09	2,740	C.
December	620	93	346	.576	.66	21,300	C.
The year	9,010	.5	429	.714	9.705	310,000	

LITTLE STONY CREEK NEAR LODOGA, CAL.

This station, which was established by the United States Reclamation Service in March, 1907, for the purpose of determining the quantity of flood water available for storage in the East Park Reservoir for use on the Orland project, is located at the East Park dam site, 3½ miles northwest of Lodoga, in the NW. ¼ NE. ¼ sec. 3, T. 17 N., R. 6 W., and is about 4 miles above the mouth of the creek. Indian Creek enters Little Stony Creek from the east a short distance above the station. Two small ditches divert water for irrigation, one 4 miles above and the other 1 mile below the station. The total amount diverted is about 5 second-feet.

Since the station was first established several gages at different locations and with independent datums have been used. During the first part of 1910 the gage was an inclined staff on the left bank, 20 feet below the cable from which discharge measurements are made. Since August, 1910, the gage in the East Park reservoir has been used to determine the discharge of the creek.

As the channel is somewhat shifting, the record for high stages is approximate. For medium and low stages the records are fairly good.

Discharge measurements of Little Stony Creek near Lodoga, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 24	F. H. Tillinghast	80	199	5.45	1,190
28	T. C. Johnson	50	71	3.88	175
Mar. 16	.....do	40	32	3.55	61

NOTE.—Measurements were made by the United States Reclamation Service.

Daily gage height, in feet, of Little Stony Creek near Lodoga, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.34	3.77	3.75	3.90	3.30	3.00	2.90	2.76	.....	.....	.....	11.73
2	3.31	3.70	3.75	3.82	3.30	2.90	2.90	2.76	.....	.....	.....	11.76
3	3.29	3.65	3.74	3.75	3.30	2.70	2.90	2.76	.....	.....	.....	11.79
4	3.27	3.60	3.74	3.70	3.30	2.70	2.90	2.76	.....	.....	.....	11.82
5	3.06	3.58	3.74	3.68	3.30	2.78	2.90	2.76	.....	.....	.....	12.05
6	2.94	3.57	3.70	3.64	3.28	2.78	2.90	2.76	.....	.....	.....	12.50
7	2.86	3.55	3.65	3.62	3.26	2.78	2.90	2.76	.....	.....	.....	13.10
8	2.87	3.58	3.62	3.60	3.24	2.78	2.88	2.76	.....	.....	.....	13.50
9	2.88	3.75	3.62	3.58	3.20	2.78	2.86	2.76	.....	.....	.....	13.90
10	2.89	3.80	3.80	3.57	3.20	2.78	2.84	2.76	.....	.....	.....	14.30
11	2.99	3.78	3.72	3.55	3.10	2.78	2.82	2.76	.....	.....	.....	15.20
12	3.01	3.76	3.62	3.60	3.10	2.68	2.80	2.76	.....	.....	.....	16.20
13	3.12	3.70	3.62	3.60	3.10	2.68	2.78	2.76	.....	.....	.....	16.70
14	3.21	3.68	3.58	3.58	3.10	2.68	2.78	2.72	.....	.....	.....	17.20
15	3.36	3.66	3.55	3.55	3.10	2.68	2.78	2.70	.....	.....	.....	17.50
16	3.59	3.60	3.55	3.53	3.10	2.68	2.78	2.68	.....	.....	.....	17.80
17	3.62	3.55	3.55	3.51	3.10	2.68	2.78	2.66	.....	.....	.....	18.10
18	3.64	3.52	3.55	3.50	2.70	2.68	2.78	2.64	.....	.....	.....	18.30
19	3.62	3.55	3.55	3.48	2.70	2.68	2.78	2.62	.....	.....	.....	18.50
20	3.61	3.55	3.55	3.46	2.70	2.68	2.76	2.60	.....	.....	.....	18.70
21	3.60	3.55	4.19	3.43	2.90	2.68	2.76	2.58	.....	.....	.....	18.90
22	3.61	3.58	4.82	3.40	3.05	2.68	2.76	2.56	.....	.....	.....	19.10
23	3.78	3.55	4.60	3.38	3.05	2.94	2.76	2.54	.....	.....	.....	19.30
24	5.55	3.58	4.28	3.36	3.05	2.95	2.76	2.52	.....	.....	.....	19.50
25	4.16	3.60	4.12	3.35	3.05	3.28	2.76	2.50	.....	.....	.....	19.70
26	4.09	3.75	4.00	3.34	3.05	3.30	2.76	.....	.....	.....	.....	19.80
27	3.93	3.75	4.31	3.33	3.03	2.92	2.76	.....	.....	.....	.....	19.90
28	3.83	3.75	4.40	3.32	3.00	2.90	2.76	.....	.....	.....	.....	20.00
29	3.69	.....	4.15	3.31	3.00	2.90	2.76	.....	.....	.....	.....	20.10
30	3.66	.....	4.08	3.30	3.00	2.90	2.76	.....	.....	.....	.....	20.20
31	3.60	.....	3.90	.....	3.00	.....	2.76	.....	.....	.....	.....	20.30

NOTE.—Gage heights for December taken from a gage at East Park reservoir. Creek probably dry from Aug. 26 to Nov. 30.

Daily discharge, in second-feet, of Little Stony Creek near Lodoga, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	31	112	106	155	27	7.0	3.0	0.8	.....	.....	.....	1.0
2	28	92	106	127	27	3.0	3.0	.8	.....	.....	.....	1.0
3	26	80	103	106	27	.5	3.0	.8	.....	.....	.....	1.2
4	24	69	103	92	27	.5	3.0	.8	.....	.....	.....	1.2
5	9.7	65	103	87	27	.9	3.0	.8	.....	.....	.....	1.4
6	4.6	64	92	78	25	.9	3.0	.8	.....	.....	.....	4.0
7	2.2	60	80	74	23	.9	3.0	.8	.....	.....	.....	5.5
8	2.4	65	74	69	22	.9	2.6	.8	.....	.....	.....	4.5
9	2.6	106	74	65	18	.9	2.2	.8	.....	.....	.....	4.5
10	2.8	120	120	64	18	.9	1.8	.8	.....	.....	.....	4.0
11	6.6	114	98	60	11.5	.9	1.4	.8	.....	.....	.....	11.0
12	7.4	109	74	69	11.5	.4	1.0	.8	.....	.....	.....	23.0
13	12.8	92	74	69	11.5	.4	.9	.8	.....	.....	.....	8.0
14	19	87	65	65	11.5	.4	.9	.6	.....	.....	.....	5.5
15	33	83	60	60	11.5	.4	.9	.5	.....	.....	.....	5.0
16	67	69	60	56	11.5	.4	.9	.4	.....	.....	.....	5.0
17	74	60	60	53	11.5	.4	.9	.4	.....	.....	.....	5.0
18	78	55	60	51	.5	.4	.9	.3	.....	.....	.....	4.0
19	74	60	60	48	.5	.4	.9	.3	.....	.....	.....	3.5
20	71	60	60	45	.5	.4	.8	.2	.....	.....	.....	3.5
21	69	60	281	41	3.0	.4	.8	.2	.....	.....	.....	3.0
22	71	65	671	37	9.2	.4	.8	.1	.....	.....	.....	3.0
23	114	60	522	35	9.2	4.6	.8	.1	.....	.....	.....	3.0
24	128	65	331	33	9.2	5.0	.8	0	.....	.....	.....	3.0
25	266	69	247	32	9.2	25	.8	0	.....	.....	.....	3.0
26	232	106	192	31	9.2	27	.8	.....	.....	.....	.....	3.0
27	166	106	348	30	8.4	3.8	.8	.....	.....	.....	.....	2.0
28	130	106	400	29	7.0	3.0	.8	.....	.....	.....	.....	1.5
29	90	.....	262	28	7.0	3.0	.8	.....	.....	.....	.....	3.0
30	83	.....	228	27	7.0	3.0	.8	.....	.....	.....	.....	2.5
31	69	.....	155	.....	7.0	.....	.8	.....	.....	.....	.....	2.5

NOTE.—Daily discharge Jan. 1 to Aug. 25 determined from a discharge rating curve fairly well defined. Discharge for December computed by the United States Reclamation Service from gage heights at the East Park reservoir.

Monthly discharge of Little Stony Creek near Ladoga, Cal., for 1910.

Month.	Discharge in second-feet.			Run-off (total in acre-feet).	Accuracy.
	Maximum.	Minimum.	Mean.		
January	1,280	2.2	101	6,210	B.
February	120	55	80.7	4,480	B.
March	671	60	170	10,500	B.
April	155	27	60.5	3,600	B.
May	27	.5	13.2	812	B.
June	27	.4	3.20	190	C.
July	3	.8	1.48	91	C.
August	.8	.0	.44	27	C.
December	23	1.0	4.24	261	.....

NOTE.—Records for December computed from gage heights taken at the East Park reservoir. The creek was probably dry during the greater part of September, October, and November.

FEATHER RIVER BASIN.

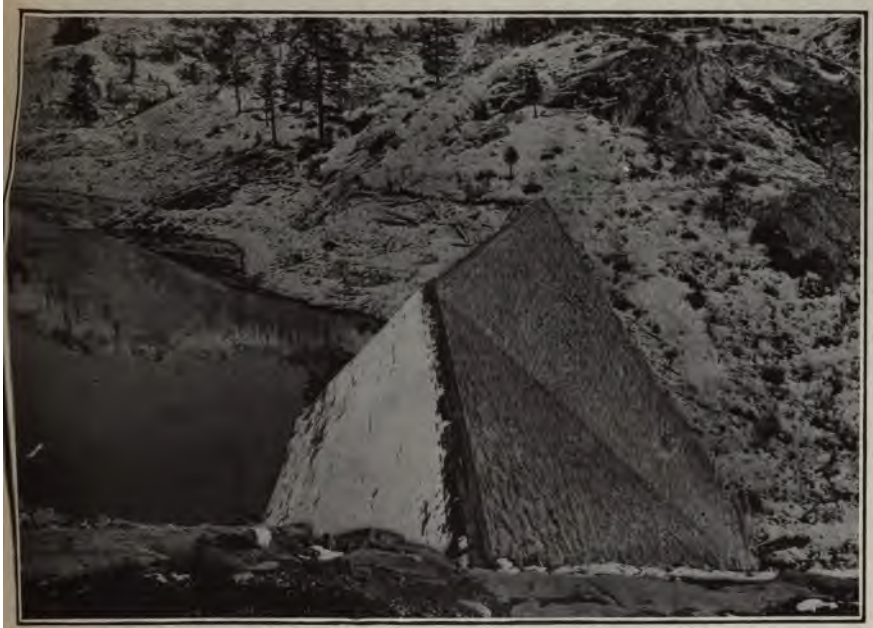
GENERAL FEATURES.

Feather River heads on the crest of the Sierra and takes a general southerly course to its union with the Sacramento about 30 miles south of Marysville and about 15 miles northwest of Sacramento. Its total length is about 175 miles and its drainage area comprises approximately 6,590 square miles, lying on the western slope of the Sierra Nevada, south of the Pit River basin, and north of the American River basin.

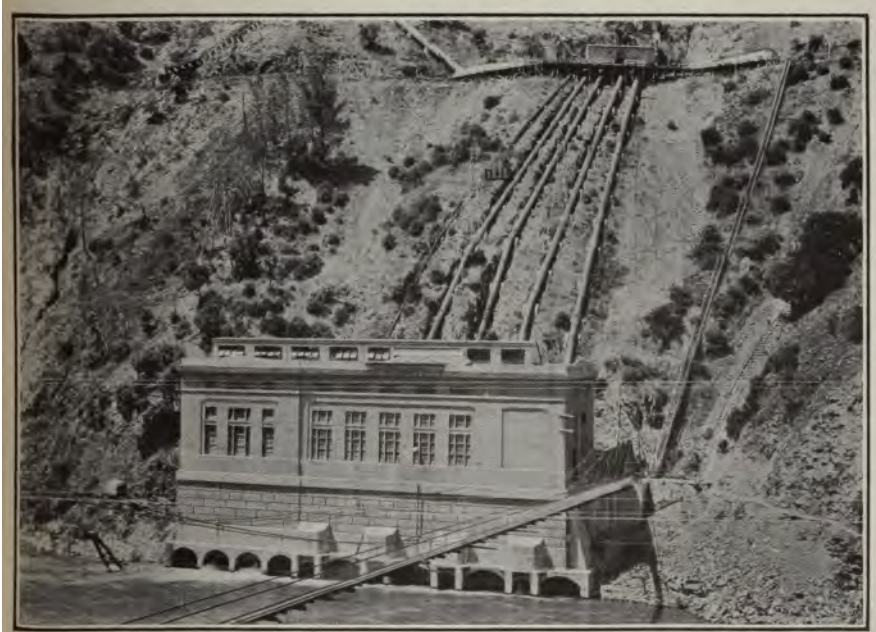
The basin is naturally subdivided into three other comparatively large basins: North Fork basin at the north and west, with a total drainage area of about 2,220 square miles; Middle Fork basin in the center and at the east, with a total drainage area of about 1,340 square miles; and Yuba River basin at the south, with a total drainage area of more than 1,300 square miles.

The drainage basin of the North Fork, here regarded as the main stream, includes the eastern part of Butte, the greater part of Plumas, and the southwestern corner of Lassen counties. The junction of North and Middle forks is in Butte County, about 6 miles northeast of Oroville. The length of North Fork basin does not exceed 75 miles, and its width in Plumas County is about 65 miles. Middle Fork basin is long but comparatively narrow except at its east end, where it broadens out and includes Sierra Valley, a large meadow valley at an altitude of 5,000 feet. Beckwith Pass, which opens into this valley from the east, is the lowest pass in the Sierra Nevada, and has an elevation of about 5,200 feet above sea level. Sierra Valley and the surrounding country are very dry in the summer. The greatest elevation in the Middle Fork basin is about 8,500 feet.

Butt Creek joins North Fork from the west about 12 miles south of Prattville. It has a total drainage area of 74 square miles. Indian Creek enters North Fork from the east about 20 miles southwest of Prattville, and has a total drainage area of about 1,020 square miles.



A. BOWMAN DAM, SOUTH FORK OF YUBA RIVER.



B. GREAT WESTERN POWER CO.'S PLANT ON NORTH FORK OF FEATHER RIVER AT BIG BEND.

Yuba River rises near the crest on the western slope of the high Sierra and flows southwestward to its junction with Feather River at Marysville. The total length of the stream is about 90 miles. Its basin lies south of the Middle Fork of Feather River basin, west of the Truckee River basin and north of the American and Bear River basins, is chiefly in Yuba, Sierra, and Nevada counties, and is one of the principal subdivisions of the Feather River basin. It comprises an area of more than 1,300 square miles in extent. Its extreme length from the mouth of the Yuba to the crest of the Sierra is about 70 miles, and its greatest width is about 35 miles. The most important tributaries are North Fork of Yuba, South Fork of Yuba, and Deer Creek from the east, and North Fork of North Fork and Canyon Creek from the north. A dam on the South Fork of the Yuba is shown on Plate IV, *A*.

Bear River, the principal tributary of the Feather below the Yuba, drains a narrow strip comprising 300 square miles, lying on the western slope of the Sierra below an altitude of 5,500 feet. The river rises near Emigrant Gap, in the extreme northeastern part of its basin, and flows southwestward to its junction with Feather River about 15 miles south of Marysville. It is the boundary line between Nevada and Placer counties and closely parallels the Bear-American divide, which is 1 to 2 miles south of it. Its principal tributaries are Steep Hollow Creek, Greenhorn River, and Wolf Creek, all from the north.

NORTH FORK OF FEATHER RIVER BELOW PRATTVILLE, CAL.

This station, which is located in the canyon at the proposed dam site of the Great Western Power Co., about 3 miles below the Meadow View bridge crossing on the Prattville-Greenville road, and about 5 miles southeast of Prattville, was established by the power company November 22, 1905. (See Pl. IV, *B*.)

Butt Creek enters from the west about 5 miles below the station, and Indian Creek from the east about 15 miles below; North Fork and Hamilton Branch unite about 5 miles above.

Thin sheet ice forms occasionally, but does not materially affect the relation between gage height and discharge.

The bed is rocky and is not likely to change greatly. The current is swift at high water, but its velocity is moderate at other stages. At low water the stream is about 60 feet wide and has a maximum depth of 9 feet.

A staff gage is located 700 feet above the cable section. Gage heights are recorded by automatic register. The datum of the gage has remained unchanged.

Measurements were made from a boat until November 22, 1905, since which time they have been made from a cable and car.

Records at this station are very good.

Determinations of discharge are published as furnished by the company.

Daily discharge, in second-feet, of North Fork of Feather River below Prattville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	927	862	1,253	1,608	1,690	880	685	620	595	612	616	755
2	899	797	1,331	1,652	1,620	873	685	616	592	620	616	877
3	829	800	1,467	1,660	1,585	857	679	613	592	620	625	914
4	797	812	1,806	1,660	1,590	842	679	609	607	632	625	975
5	804	812	2,147	1,635	1,536	830	679	609	609	635	625	857
6	812	827	2,176	1,646	1,452	819	675	613	607	628	625	751
7	819	837	2,170	1,677	1,392	815	671	613	602	628	625	712
8	808	837	2,176	1,715	1,376	804	671	613	602	625	660	745
9	819	837	2,242	1,770	1,397	797	679	609	602	625	733	1,254
10	819	830	2,280	1,810	1,440	783	682	607	602	625	678	1,800
11	804	857	2,230	1,912	1,457	778	679	609	609	643	698	2,004
12	797	873	2,197	1,865	1,415	770	679	609	609	667	698	1,810
13	789	918	2,200	1,780	1,366	770	682	607	616	652	688	1,405
14	741	960	2,216	1,748	1,342	763	675	602	620	639	660	1,153
15	808	918	2,186	1,728	1,322	759	671	599	635	639	660	988
16	800	873	2,084	1,720	1,298	755	664	595	688	635	642	910
17	800	862	2,084	1,745	1,188	755	656	592	664	628	642	808
18	800	869	2,230	1,793	1,148	751	652	595	652	625	667	783
19	800	865	2,760	1,850	1,121	747	656	595	649	620	667	759
20	800	910	3,368	1,930	1,121	741	671	592	643	616	652	745
21	800	924	3,468	1,939	1,049	737	667	595	639	616	645	733
22	827	931	3,220	1,896	1,106	737	653	595	635	616	660	697
23	924	910	2,817	1,880	1,066	733	648	595	635	616	665	688
24	1,015	1,053	2,444	1,896	1,040	726	649	595	628	616	810	637
25	1,001	1,167	2,158	1,896	1,018	719	646	595	625	616	922	667
26	939	1,070	1,945	1,885	980	715	643	599	625	616	845	635
27	906	1,075	1,859	1,868	948	708	639	589	625	616	810	616
28	887	1,140	1,745	1,806	944	697	635	595	625	616	810	607
29	880	.....	1,647	1,733	927	688	632	595	625	616	810	607
30	850	.....	1,590	1,684	910	685	628	595	625	616	810	602
31	850	.....	1,585	.....	892	.....	625	595	.....	616	.....	607

NOTE.—Determinations of daily discharge furnished by the Great Western Power Co. Discharge Jan. 16 to 21 and Sept. 25 to 29 estimated.

Monthly discharge of North Fork of Feather River below Prattville, Cal., for 1910.

[Drainage area, 506 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	1,015	741	844	1.67	1.92	51,900
February	1,167	797	908	1.79	1.86	50,400
March	3,468	1,253	2,160	4.27	4.92	133,000
April	1,939	1,608	1,780	3.52	3.93	106,000
May	1,690	892	1,250	2.47	2.85	76,900
June	880	685	768	1.52	1.70	45,700
July	685	625	662	1.31	1.51	40,700
August	620	589	602	1.19	1.37	37,000
September	688	592	623	1.23	1.37	37,100
October	667	612	625	1.24	1.43	33,400
November	922	616	696	1.38	1.54	41,400
December	2,004	602	908	1.79	2.06	55,800
The year	3,468	589	987	1.95	26.46	714,000

NOTE.—Estimates computed by the Geological Survey from daily discharge determined by the Great Western Power Co.

NORTH FORK OF FEATHER RIVER NEAR BIG BEND, CAL.

This station was established June 13, 1905, and is located about 300 feet above the head of Big Bend tunnel and about 20 miles north of Oroville.

No important tributaries enter for many miles above the station. West Branch enters from the west about 10 miles below the station by river, and Middle Fork comes in from the east about 20 miles below.

The datum of the staff gage remained unchanged from 1905 to 1907. During 1908 the gage was changed several times, owing to construction work about the head of Big Bend tunnel.

Discharge measurements are made by means of a boat when the stage is below 11 feet. For higher stages float measurements are made at this point and check measurements are made 2 miles downstream, from the cable of the Golden State Power Co.

The stream has a rock channel which is practically permanent. At low water the stream is about 85 feet wide and 19 feet deep and has a sluggish but uniform current.

Determinations of daily discharge are published as furnished by the Great Western Power Co., which has maintained this station since its establishment.

Daily discharge, in second-feet, of North Fork of Feather River near Big Bend, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	5,910	3,079	6,342	6,813	6,020	2,161	1,295	1,026	957	975	1,017	1,350
2	4,110	2,759	7,295	7,212	5,527	2,050	1,315	1,033	948	984	1,011	1,320
3	3,098	2,580	8,000	7,375	5,712	1,984	1,279	1,030	948	987	1,005	3,640
4	2,785	2,598	8,700	7,088	5,214	1,844	1,279	1,017	948	991	1,005	3,460
5	2,430	2,605	8,948	6,901	4,818	1,717	1,279	1,011	942	996	1,002	2,195
6	2,455	2,625	8,850	6,915	4,820	1,705	1,264	1,005	942	996	1,005	1,890
7	2,537	2,732	8,677	6,942	4,648	1,745	1,256	996	939	984	1,011	1,690
8	2,642	2,656	8,480	7,113	4,648	1,690	1,249	988	940	984	1,113	2,335
9	2,393	2,610	8,370	7,352	5,300	1,670	1,219	984	940	975	1,177	4,510
10	2,437	2,851	8,532	7,540	5,460	1,640	1,204	981	942	975	1,149	5,045
11	2,290	2,579	8,675	7,957	5,040	1,620	1,189	975	942	1,074	1,245	5,573
12	2,192	2,575	8,660	7,270	5,050	1,600	1,175	978	945	1,169	1,416	4,325
13	2,250	2,689	8,755	6,950	4,778	1,575	1,175	978	955	1,089	1,281	3,400
14	2,275	2,800	8,760	6,740	5,110	1,550	1,161	978	964	1,014	1,173	2,860
15	2,422	3,260	8,475	6,597	4,363	1,535	1,161	969	1,053	999	1,125	2,452
16	2,252	3,065	8,282	6,547	4,072	1,520	1,149	963	1,158	993	1,098	2,115
17	2,182	2,882	8,180	6,823	3,449	1,505	1,131	957	1,132	990	1,077	1,861
18	2,100	2,837	9,255	7,352	3,371	1,490	1,125	954	1,124	987	1,206	1,795
19	2,118	3,125	12,165	7,685	3,419	1,475	1,126	954	1,059	990	1,221	1,675
20	2,195	3,473	13,473	7,695	3,178	1,465	1,137	954	1,056	1,005	1,155	1,590
21	2,163	3,181	14,555	7,670	3,111	1,452	1,138	940	1,044	1,014	1,031	1,545
22	2,377	3,108	12,925	7,530	3,016	1,459	1,101	951	1,038	1,008	1,143	1,530
23	3,075	3,532	11,848	7,445	3,100	1,444	1,086	951	1,020	1,003	1,494	1,502
24	5,165	4,194	10,498	7,465	3,019	1,429	1,071	945	1,015	1,002	2,184	1,475
25	6,462	8,485	9,265	7,292	2,899	1,399	1,071	954	1,012	1,005	2,397	1,475
26	3,810	8,299	8,307	7,095	2,813	1,369	1,071	966	1,005	1,011	1,839	1,406
27	3,734	6,259	7,690	6,625	2,582	1,339	1,071	960	1,011	1,002	1,584	1,330
28	3,480	6,138	7,118	6,407	2,384	1,309	1,071	948	998	1,002	1,494	1,240
29	3,330	.....	6,730	5,815	2,435	1,309	1,054	943	978	1,005	1,407	1,225
30	3,090	.....	6,515	5,707	2,447	1,309	1,040	942	972	1,004	1,344	1,217
31	3,003	.....	6,555	.....	2,173	.....	1,035	947	.....	1,017	.....	1,320

NOTE.—Daily discharge determined by the Great Western Power Co.

Monthly discharge of North Fork of Feather River near Big Bend, Cal., for 1910.

[Drainage area, 1,940 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	6,462	2,100	2,990	1.54	1.78	184,000
February	8,485	2,575	3,560	1.84	1.92	198,000
March	14,555	6,342	9,000	4.64	5.35	553,000
April	7,957	5,707	7,060	3.64	4.06	420,000
May	6,020	2,173	4,000	2.06	2.38	246,000
June	2,161	1,309	1,580	.814	.91	94,000
July	1,315	1,035	1,160	.598	.69	71,300
August	1,033	940	973	.502	.58	59,800
September	1,158	939	998	.514	.57	59,400
October	1,169	975	1,010	.521	.60	62,100
November	2,397	1,002	1,280	.660	.74	76,200
December	5,573	1,217	2,240	1.15	1.33	138,000
The year	14,555	939	2,980	1.54	20.91	2,160,000

NOTE.—Estimates were computed by the Geological Survey from the daily discharge table furnished by the Great Western Power Co.

FEATHER RIVER AT OROVILLE, CAL.

This station, which is located near the Oroville highway bridge, in sec. 8, T. 19 N., R. 4 E., about 6 miles below the junction of North and Middle forks, and about 30 miles above the mouth of Yuba River, was originally established January 1, 1902. No important tributaries enter near the station.

No water is diverted immediately above the station, and all acquired water rights above are probably for power development. An irrigation project for lands in the vicinity of Biggs, Gridley, and Live Oak, is under construction. Water filings equal to the entire low-water flow have been made by the company interested in this reclamation. The point of diversion is a short distance below Oroville.

The United States Weather Bureau gage, located at the bridge, was read from 1902 to 1905. All gage heights for those years refer to a datum 2 feet lower than that used by the United States Weather Bureau in order to avoid minus readings. Discharge measurements were made from a boat about 500 feet above the bridge.

In December, 1905, the station was moved about 1,000 feet above the bridge, a staff gage was installed on the left bank, and a cable erected near the gage. The bridge gage was read from January 1 to February 28, 1906, and from September 5 to December 31; the cable gage from March 1 to July 24, 1906. No readings were made from July 25 to September 4, 1906. All gage heights for 1906 were reduced to the datum of the cable gage by means of a table of comparative readings on the two gages. The station was completely destroyed by the flood of March, 1907, which took away the gage

and the cable. From March 19 to April 7, 1907, the United States Weather Bureau gage on the bridge was read and the readings corrected to the datum of the cable gage.

On April 8, 1907, a new staff gage in several sections, referred to the old datum, was installed on the left bank, 1,000 feet above the highway bridge. A new cable was placed across the river October 10, 1907, about 125 feet below the old one and 20 feet below the new gage.

When the station on Feather River was established at the new location above the Oroville Bridge the section was thought to be fairly permanent, but measurements made during the last four years show changes in the gaging section, or in the stream channel below the gaging section, which have made it impossible to obtain a permanent rating curve. The construction of the Western Pacific Railway through the canyon of the Feather resulted in washing large amounts of heavy débris into the river channel. Undoubtedly this débris is constantly being brought down the river during periods of flood discharge.

There are many uncertainties in the past records on account of the washing out of gages, unreliable observers, and shifting channel.

Conditions for obtaining accurate measurements at high stages are poor. At other stages the discharge data are fairly reliable, though the channel is subject to change and frequent measurements are necessary. At low stage the stream is about 280 feet wide and 10 to 15 feet deep, and the current is sluggish. The records for 1910 may be considered good.

Discharge measurements of Feather River at Oroville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 22	J. E. Stewart	287	3,190	6.87	5,260
Mar. 16	....do	297	4,160	10.12	15,400
May 25	....do	288	3,440	6.78	4,740
July 5	....do	278	2,800	4.46	2,080
Aug. 5	....do	266	2,490	3.52	1,150
Oct. 29	....do	269	2,610	3.79	1,410
Dec. 16	....do	283	3,120	5.66	3,500

Daily gage height, in feet, of Feather River at Oroville, Cal., for 1910.

[E. S. Blackmore, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.0	7.6	10.0	9.4	8.7	5.9	4.3	3.9	3.3	3.6	3.9	4.2
2	8.3	7.5	10.3	9.6	8.6	5.8	4.2	4.0	3.4	3.5	3.8	4.2
3	7.8	7.4	10.8	9.7	8.6	5.7	4.0	3.8	3.4	3.5	3.7	6.3
4	7.5	7.2	10.9	9.5	8.3	5.6	4.3	3.7	3.5	3.6	3.7	6.0
5	7.2	7.0	10.9	9.4	8.1	5.5	4.2	3.6	3.5	3.5	3.7	5.8
6	7.3	7.0	10.9	9.5	8.0	5.3	4.1	3.7	3.5	3.6	3.6	5.1
7	7.3	7.7	10.9	9.5	8.0	5.5	4.1	3.7	3.4	3.5	3.6	5.0
8	7.1	7.3	10.7	9.5	8.1	5.4	4.1	3.8	3.4	3.6	4.3	5.1
9	7.2	7.5	10.5	9.7	8.2	5.3	4.2	3.8	3.4	3.4	4.1	8.2
10	7.0	7.3	10.6	9.8	8.5	5.0	4.0	3.8	3.4	3.4	4.0	8.1

Daily gage height, in feet, of Feather River at Oroville, Cal., in 1910—Continued

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July,	Aug.	Sept.	Oct.	Nov.
11	6.8	7.1	10.6	10.0	8.3	5.1	3.8	3.6	3.4	3.5	4.1
12	6.7	7.1	10.5	9.6	8.1	5.0	3.9	3.8	3.5	4.6	4.4
13	6.6	7.0	10.4	9.4	8.0	5.0	4.2	3.8	3.5	4.4	4.4
14	7.1	7.5	10.4	9.3	7.9	5.0	4.1	3.8	3.7	4.2	4.2
15	7.7	7.5	10.2	9.3	7.8	5.0	4.1	3.9	3.8	3.5	4.0
16	7.7	7.3	10.0	9.4	.....	4.9	4.0	3.7	3.7	3.8	3.5
17	7.0	7.2	10.1	9.5	7.6	4.9	4.2	3.6	3.6	3.8	3.9
18	6.8	7.2	10.4	9.5	7.5	4.8	4.1	3.6	3.6	3.5	4.5
19	6.7	8.1	12.3	9.7	7.4	4.8	4.0	3.7	3.6	3.3	4.2
20	6.7	7.7	12.5	9.7	7.3	4.8	4.0	3.8	3.6	3.45	4.1
21	6.5	7.5	12.7	9.6	7.2	4.8	3.9	3.8	3.5	3.55	4.0
22	6.9	8.1	12.4	9.5	7.2	4.7	3.9	3.9	3.5	3.3	4.1
23	7.6	8.3	11.9	9.5	7.0	4.6	3.8	3.8	3.5	3.5	4.0
24	10.0	9.5	11.1	9.5	6.9	4.6	3.9	3.8	3.5	3.4	5.4
25	8.5	11.3	10.5	9.5	6.7	4.3	3.9	3.8	3.5	3.2	6.5
26	8.5	10.2	10.1	9.5	6.6	4.4	3.9	3.7	3.6	3.6	5.4
27	8.1	9.5	9.9	9.3	6.5	4.5	3.9	3.8	3.6	3.6	4.9
28	7.9	9.5	9.5	9.2	6.4	4.5	3.8	3.7	3.5	3.3	4.5
29	7.7	.....	9.4	9.0	6.3	4.4	3.8	3.6	3.5	3.9	4.5
30	7.6	.....	9.2	8.9	6.1	4.3	3.8	3.4	3.5	3.9	4.3
31	7.5	.....	9.1	.....	6.0	.....	3.8	3.3	.....	3.9	.....

Daily discharge, in second-feet, of Feather River at Oroville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
1	10,800	6,780	14,700	12,300	9,830	3,730	1,880	1,500	1,010	1,240	1,500
2	8,620	6,550	16,000	13,100	9,510	3,600	1,780	1,590	1,080	1,160	1,400
3	7,280	6,320	18,400	13,500	9,510	3,470	1,590	1,400	1,080	1,160	1,320
4	6,550	5,890	19,000	12,700	8,620	3,340	1,880	1,320	1,160	1,240	1,320
5	5,890	5,490	19,000	12,300	8,060	3,220	1,780	1,240	1,160	1,160	1,320
6	6,100	5,490	19,000	12,700	7,800	2,980	1,680	1,320	1,160	1,240	1,240
7	6,100	7,020	19,000	12,700	7,800	3,220	1,680	1,320	1,080	1,160	1,240
8	5,690	6,100	18,000	12,700	8,060	3,100	1,680	1,400	1,080	1,240	1,880
9	5,890	6,550	17,000	13,500	8,340	2,980	1,780	1,400	1,080	1,080	1,680
10	5,490	6,100	17,400	13,900	9,200	2,620	1,590	1,400	1,080	1,080	1,590
11	5,120	5,690	17,400	14,700	8,620	2,740	1,400	1,240	1,080	1,160	1,680
12	4,940	5,090	17,000	13,100	8,060	2,620	1,500	1,400	1,160	2,180	1,980
13	4,770	5,490	16,500	12,300	7,800	2,620	1,780	1,400	1,160	1,980	1,980
14	5,690	6,550	16,500	11,900	7,540	2,620	1,680	1,400	1,320	1,780	1,780
15	7,020	6,550	15,600	11,900	7,280	2,620	1,680	1,500	1,400	1,160	1,590
16	7,020	6,100	14,700	12,300	7,020	2,510	1,590	1,320	1,320	1,400	1,160
17	5,490	5,890	15,200	12,700	6,780	2,510	1,780	1,240	1,240	1,400	1,500
18	5,120	5,890	16,500	12,700	6,550	2,400	1,680	1,240	1,240	1,160	2,080
19	4,940	8,060	26,600	13,500	6,320	2,400	1,590	1,320	1,240	1,010	1,780
20	4,940	7,020	27,900	13,500	6,100	2,400	1,590	1,400	1,240	1,120	1,680
21	4,610	6,550	29,200	13,100	5,890	2,400	1,500	1,400	1,160	1,200	1,590
22	5,300	8,060	27,200	12,700	5,890	2,290	1,500	1,500	1,160	1,010	1,680
23	6,780	8,620	24,300	12,700	5,490	2,180	1,400	1,400	1,160	1,160	1,590
24	14,700	12,700	20,000	12,700	5,300	2,180	1,500	1,400	1,160	1,080	3,100
25	9,200	21,000	17,000	12,700	4,940	1,880	1,500	1,400	1,160	940	4,610
26	9,200	15,600	15,200	12,700	4,770	1,980	1,500	1,320	1,240	1,240	3,100
27	8,060	12,700	14,300	11,900	4,610	2,080	1,500	1,400	1,240	1,240	2,510
28	7,540	12,700	12,700	11,600	4,450	2,080	1,400	1,320	1,160	1,010	2,080
29	7,020	.....	12,300	10,800	4,300	1,980	1,400	1,240	1,160	1,500	2,080
30	6,780	.....	11,600	10,500	4,000	1,880	1,400	1,080	1,160	1,500	1,880
31	6,550	.....	11,200	.....	3,860	.....	1,400	1,010	.....	1,500	.....

NOTE.—Daily discharge determined from a well-defined discharge rating curve.

Monthly discharge of Feather River at Oroville, Cal., for 1910.

[Drainage area, 3,640 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	14,700	4,610	6,750	1.85	2.13	415,000	A.
February	21,000	5,490	7,970	2.19	2.28	443,000	A.
March	29,200	11,200	17,900	4.92	5.67	1,100,000	A.
April	14,700	10,500	12,600	3.46	3.86	750,000	A.
May	9,830	3,860	6,850	1.88	2.17	421,000	A.
June	3,730	1,880	2,620	.720	.80	156,000	A.
July	1,880	1,400	1,600	.440	.51	98,400	A.
August	1,590	1,010	1,350	.371	.43	83,000	A.
September	1,400	1,010	1,170	.321	.36	69,600	A.
October	2,180	940	1,200	.330	.38	73,800	A.
November	4,610	1,160	1,860	.511	.57	111,000	A.
December	8,340	1,780	3,400	.934	1.08	209,000	A.
The year	29,200	940	5,440	1.49	20.24	3,930,000	

BUTT CREEK AT BUTTE VALLEY, CAL.

Butt Creek rises in the extreme western part of Plumas County and flows eastward, discharging into North Fork of Feather River about 9 miles south of Prattville. The creek is about 25 miles long, and its drainage area comprises 74 square miles. It has an approximate fall of 3,000 feet, and is well adapted for power development.

The gaging station was established June 14, 1905, about 2 miles above the mouth of the creek and 100 feet below the footbridge at the lower end of Butte Valley. The bottom of the channel is composed of coarse gravel and shifts somewhat during extreme floods.

Measurements are made by wading at low stages and from the footbridge at high water. The staff gage is nailed to a post 15 feet below the measuring section and its datum has remained unchanged.

The records are good, as the changes in channel have been well covered by measurements.

Determinations of daily discharge are published as furnished by the Great Western Power Co., which has maintained this station since its establishment.

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Cal., for 1910.

Days.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	88	59	157	172	111	35	27.6	25.4	26.0	26.1	26	34
2	87	58	188	179	94	34.5	27.8	25.6	25.6	26.1	26	33
3	81	55	204	182	108	34	27.6	25.6	25.4	26.1	26	81
4	79	54	204	179	107	33.8	27.6	25.6	25.4	26.1	26	58
5	77	52	195	179	101	33	27.6	25.6	25.4	26.1	26	44
6	75	53	185	181	87	33	27.4	25.6	25.4	26.1	26	39
7	74	57	179	181	81	33	27.4	25.6	25.6	26.1	26	37
8	73	60	179	185	75	32.8	27.2	25.6	25.6	26.1	27	44
9	71	62	191	187	77	32.5	27.1	25.6	25.4	26.1	29	167
10	70	55	200	187	88	32.5	27.1	25.6	25.4	27	29	132

Daily discharge, in second-feet, of Butt Creek at Butte Valley, Cal., for 1910—Continued.

Days.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
11	70	57	200	232	76	32.3	26.5	26	25.4	27.8	32	140
12	63	61	204	187	74	32.3	26.5	26	25.6	28	35	94
13	64	62	220	178	71	32	26	26	26.0	28	29	52
14	64	65	232	170	66	31.7	26	26.5	26.0	27.2	28	46
15	63	65	210	161	61	31.2	26.5	26.5	26.1	26.1	28	42
16	66	68	191	167	58	30.8	26	26.5	28.6	26.1	29	41
17	66	69	211	169	55	30.4	25.6	26.5	28.5	26.1	30	40
18	66	64	255	173	52	30	25.6	26.5	27.4	26.2	32	39
19	62	60	417	173	50	29.3	25.6	27.1	27.1	26.2	29	37
20	58	60	475	176	49	29.3	25.6	27.1	27.1	26.2	30	37
21	58	62	334	172	48	29.3	25.4	27.1	26.5	26.2	30	37
22	57	71	365	162	47	28.9	25.4	26.5	26.5	26.2	31	36
23	53	61	272	155	44	28.9	25.4	27.1	26.5	26.1	32	36
24	49	94	212	148	46	28.5	25.4	27.1	26.0	26.1	67	36
25	49	204	206	134	45	28.5	25.4	27.1	26.0	26.1	85	34
26	51	132	180	124	41	28.1	25.4	26.5	26.5	26.1	65	33
27	55	108	165	120	41	28.1	25.4	26.5	27.1	26.1	47	33
28	58	112	153	117	41	28.1	25.4	26.5	26.5	26.1	46	32
29	62	.....	154	111	45	28.1	25.6	26.5	26.0	26.1	34	33
30	63	.....	158	119	38	27.8	25.4	26.5	25.6	26.2	34	34
31	60	.....	167	.....	37	.....	25.4	26.5	.....	26.2	.....	34

NOTE.—Determinations of daily discharge furnished by the Great Western Power Co.

Monthly discharge of Butt Creek at Butte Valley, Cal., for 1910.

[Drainage area, 73 square miles.]

Month.	Discharge in second-feet.				Run-off.	
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.
January	88	49	65.5	0.898	1.04	4,030
February	204	52	72.9	.999	1.04	4,050
March	475	153	221	3.03	3.49	13,600
April	232	111	165	2.26	2.52	9,820
May	111	37	65.0	.890	1.03	4,000
June	35	27.8	30.9	.423	.47	1,840
July	27.8	25.4	26.3	.360	.42	1,620
August	27.1	25.4	26.3	.360	.42	1,620
September	28.6	25.4	26.2	.359	.40	1,560
October	28	26.1	26.4	.362	.42	1,620
November	85	26	34.7	.475	.58	2,060
December	167	32	52.7	.722	.83	3,240
The year	475	25.4	67.8	.929	12.59	49,100

NOTE.—These estimates were computed by the Geological Survey from the daily discharge table furnished by the Great Western Power Co.

MIDDLE FORK OF FEATHER RIVER AT CROMBERG, CAL.

This station, which is located in the N. ½ sec. 24, T. 23 N., R. 11 E. at the California White Pine Co.'s log chute, 600 feet west of the post office at Cromberg, about 4 miles below the mouth of Jamison Creek and half a mile above the mouth of Jackson Creek, was established November 3, 1910.

No water is diverted in the vicinity of the station.

The gage is a vertical staff fastened to a pier of the log chute near the right bank.

Discharge measurements are made by wading, as a car and cable have not yet been installed.

The drainage area above the station is well forested.

The station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

The following discharge measurement was made by F. G. Wood, 150 feet above log chute:

November 3, 1910: Width, 56 feet; area, 50 square feet; gage height, 2.45 feet; discharge, 54 second-feet.

Gage height of Middle Fork of Feather River at Cromberg, Cal., for 1910.

[J. E. Nail, observer.]

	Feet.		Feet.
Nov. 3	2.45	Dec. 3	3.8
22	2.75	9	4.0
26	3.45	19	2.9
29	2.9	30	2.8

MIDDLE FORK OF YUBA RIVER NEAR NORTH SAN JUAN, CAL.[1]

This station, which is located one-fourth mile below the highway bridge at Freeman's Crossing, 3 miles northeast of North San Juan, in the N. ½ NW. ¼ sec. 23, T. 18 N., R. 8 E., in the Tahoe National Forest, was established October 27, 1910.

Oregon Creek enters three-fourths mile above and Moonshine Creek one-fourth mile below the station. The North Fork joins the Middle Fork about 4 miles below Freeman's Crossing.

The gage is a vertical staff wedged between two large bowlders on the right bank, one-fourth mile below the bridge.

As a car and cable have not yet been installed, discharge measurements are made by wading or from the highway bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Middle Fork of Yuba River near North San Juan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 12[a]	T. W. Norcross	45	49	(b)	41
Oct. 27[c]	McGlashan and Wood	45	50	4.26	72
Dec. 6[d]	F. G. Wood	65	130	4.80	178

[a] Made by wading 300 feet above bridge.
[b] Gage not installed.
[c] Made by wading 125 feet above gage, 100 feet aboveriffle.
[d] Made by wading 150 feet above gage.

[1] This stream is locally known as Middle Yuba River.

Gage height of Middle Fork of Yuba River near North San Juan, Cal., for 1910.

[C. E. Whittum, observer.]

	Feet.		Feet.
Oct. 27	4.26	Dec. 5	5.00
28	4.26	10	4.95
Nov. 5	4.27	11	6.15
11	5.05	19	5.95
19	4.35	31	5.00

YUBA RIVER NEAR SMARTSVILLE, CAL.

This station, which is located 1 mile north of Smartsville and 20 miles above Marysville, Cal., at a point in the foothills called The Narrows, in sec. 22, T. 16 N., R. 6 E., was established June 2, 1903.

Deer Creek (draining about 89.6 square miles) enters from the east about 1 mile above the station. South Fork of Yuba (draining 360 square miles) and North Fork of Yuba (draining 492 square miles) enter from the east and north about 8 and 15 miles, respectively, above the station. Dry Creek (draining area 106 square miles) enters from the north about 7 miles below the station.

No water is diverted immediately above the station. Extensive water rights have been acquired throughout this basin, and practically the entire flow of the South Fork has been preempted by filings.

The Colgate power plant of the Pacific Gas & Electric Co., located about 12 miles above the station, diverts water from the North Fork of the Yuba about 1¼ miles below Bullards Bar. Water is also diverted from the South Fork of Yuba River to the Bear River Basin. The records at this station do not, therefore, show the natural run-off from the Yuba River Basin.

At the point of measurement the channel is straight for several hundred feet and is filled to a great depth with gravel and sand—tailings from hydraulic mining—which are continually shifting, alternately filling and scouring. On this account frequent discharge measurements are made in order to determine the discharge closely. The banks are high and rocky and confine the river at all stages. The current is swift. After the rains of 1904 it was found that the bed of the stream had been lowered for an average depth of 2 feet. During recent years the bed of the stream has been lowering, and on August 1, 1906, the gage datum was lowered 10 feet.

The gage is a vertical staff in two sections and is read daily. The low-water portion is bolted to a rock wall on the left bank; the high-water portion is bolted to the wall on the right bank at the cable from which discharge measurements are made.

The shifting of the bed and the torrential nature of the stream render conditions for obtaining accurate discharge data poor. At high stages only float velocities can be measured. The record for 1910 may be considered good.

Discharge measurements of Yuba River near Smartsville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 17	J. R. McKeel	160	858	8.50	3,350
21	J. E. Stewart	153	702	8.00	2,600
27	J. R. McKeel	180	1,050	9.40	5,230
30	do	170	932	8.60	4,300
Feb. 6	do	165	796	8.00	3,140
13	do	165	794	8.10	3,280
20	do	170	910	8.50	4,190
27	do	180	1,110	9.20	5,870
Mar. 8	do	185	1,260	9.50	6,770
15	J. E. Stewart	195	1,150	9.55	6,530
May 2	J. R. McKeel	180	1,190	8.90	5,720
30	do	160	850	7.40	2,960
June 5	do	145	679	6.40	1,720
12	do	135	583	5.90	1,210
July 17	do	125	417	4.70	483
31	do	123	389	4.50	381
Aug. 14	do	122	360	4.30	317
28	do	118	348	4.20	299
Sept. 4	do	118	346	4.20	292
Oct. 23	do	118	370	4.40	364
28[a]	J. E. Stewart	105	177	4.36	357
Nov. 5	J. R. McKeel	118	365	4.40	349
20	do	125	426	4.80	527
Dec. 27	do	125	445	5.00	645

[a] Measurement made by wading 200 feet below gage.

Daily gage height, in feet, of Yuba River near Smartsville, Cal., for 1910.

[J. R. McKeel, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	12.8	9.0	9.5	9.4	9.1	7.3	5.2	.....	4.2	4.4	4.4	4.9
2	11.5	8.4	9.7	9.9	8.9	7.0	5.2	4.5	.....	4.4	.....	4.8
3	10.4	8.3	10.0	9.75	8.9	6.9	5.1	.....	4.2	.....	.....	6.5
4	9.7	8.2	10.0	9.6	8.5	6.6	5.1	4.5	4.2	4.4	4.4	7.9
5	9.2	8.1	9.9	9.6	8.4	6.4	5.1	.....	.....	.....	4.4	6.6
6	8.9	8.0	9.7	9.6	8.4	6.3	.....	4.4	4.2	4.4	.....	5.9
7	8.8	9.0	9.5	9.6	8.3	6.3	.....	.....	.....	.....	4.4	5.7
8	8.7	8.4	9.5	9.8	9.1	6.2	5.0	4.4	4.2	4.4	4.5	5.6
9	8.7	8.2	9.6	10.2	9.5	6.1	.....	.....	.....	4.3	5.0	5.6
10	8.5	8.1	9.9	10.4	9.7	6.0	4.9	4.4	4.2	4.3	4.8	6.4
11	8.3	8.1	9.9	10.6	9.4	6.0	4.9	.....	.....	4.5	4.6	10.4
12	8.1	8.0	9.9	9.7	8.9	5.9	.....	4.3	4.2	5.1	5.8	7.4
13	8.0	8.1	9.9	9.8	9.0	5.9	4.8	.....	.....	4.9	5.2	6.5
14	8.9	8.3	10.0	9.7	9.0	5.8	4.8	4.3	4.2	4.7	4.9	6.2
15	9.8	8.1	9.6	9.5	.....	5.9	.....	.....	4.5	4.6	4.7	6.0
16	9.2	8.0	9.2	9.8	8.6	5.8	4.7	4.3	5.9	4.6	4.6	5.9
17	8.5	7.9	9.2	10.4	8.6	5.7	4.7	.....	5.1	4.6	4.6	5.8
18	8.3	8.0	10.2	10.7	8.5	5.6	.....	4.3	4.8	4.5	4.8	5.7
19	8.1	9.2	13.0	11.0	8.4	.....	4.7	.....	4.6	4.5	5.0	5.6
20	8.0	8.5	13.5	11.0	8.2	5.6	.....	4.3	4.5	4.5	4.8	5.5
21	8.0	8.3	12.9	10.7	8.1	5.6	4.7	.....	4.5	4.5	4.7	5.4
22	8.2	9.1	12.5	10.5	8.1	5.5	.....	4.2	.....	4.4	4.7	5.3
23	9.1	8.5	11.5	10.4	8.3	5.5	4.6	.....	4.5	4.4	4.7	5.2
24	13.9	8.9	10.8	10.45	8.3	5.5	.....	4.2	4.5	4.4	6.0	5.1
25	10.9	11.6	10.5	10.5	8.2	5.4	4.6	4.2	4.4	4.4	7.4	.....
26	.....	10.2	9.8	10.6	8.0	.....	.....	.....	.....	4.4	5.9	5.0
27	9.4	9.2	9.5	10.5	7.7	5.3	4.6	4.2	4.4	4.4	5.3	5.0
28	9.0	9.0	9.3	10.5	7.6	5.3	4.5	4.2	.....	4.4	5.2	5.0
29	8.8	.....	9.1	9.8	7.5	5.2	.....	.....	4.4	4.4	5.0	5.0
30	8.6	.....	9.0	9.4	7.4	5.2	4.5	4.2	.....	.....	4.9	5.0
31	8.5	.....	9.3	.....	7.4	.....	4.5	.....	.....	4.4	.....	4.9

Daily discharge, in second-feet, of Yuba River near Smartsville, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	10,300	4,900	6,600	6,400	5,800	2,830	730	390	295	355	355	575
2	7,650	3,850	7,000	7,410	5,400	2,430	730	390	295	355	355	525
3	5,550	3,700	7,620	7,100	5,400	2,300	675	390	295	355	355	1,830
4	4,400	3,550	7,620	6,800	4,640	1,940	675	390	295	355	355	3,700
5	3,650	3,400	7,410	6,800	4,460	1,720	675	372	295	355	355	1,940
6	3,270	3,250	7,000	6,800	4,460	1,610	625	355	295	355	355	1,220
7	3,150	4,900	6,600	6,800	4,300	1,610	625	355	295	355	355	1,060
8	3,050	3,850	6,600	7,200	5,800	1,510	625	355	295	355	390	990
9	3,050	3,550	6,800	8,000	6,600	1,410	600	355	295	320	625	990
10	2,870	3,400	7,410	8,500	7,000	1,310	575	355	295	320	525	1,720
11	2,670	3,400	7,410	8,960	6,400	1,310	575	338	295	390	435	8,500
12	2,450	3,250	7,410	7,000	5,400	1,220	550	320	295	675	1,140	2,970
13	2,400	3,400	7,410	7,200	5,600	1,220	525	320	295	575	730	1,830
14	3,750	3,700	7,620	7,000	5,600	1,140	525	320	295	480	575	1,510
15	5,300	3,400	6,800	6,600	5,200	1,220	502	320	390	435	480	1,310
16	4,300	3,250	6,000	7,200	4,820	1,140	480	320	1,220	435	435	1,220
17	3,350	3,120	6,000	8,500	4,820	1,000	480	320	675	435	435	1,140
18	3,070	3,250	8,060	9,190	4,640	990	480	320	525	390	525	1,060
19	2,800	5,250	14,800	9,890	4,460	990	480	320	435	390	625	990
20	2,700	4,050	16,100	9,890	4,150	990	480	320	390	390	525	915
21	2,670	3,800	14,600	9,190	4,000	990	480	308	390	390	480	850
22	3,020	5,300	13,600	8,730	4,000	915	458	295	390	355	480	790
23	4,500	4,350	11,100	8,500	4,300	915	435	295	390	355	480	730
24	13,000	5,120	9,420	8,620	4,300	915	435	295	390	355	1,310	675
25	8,000	10,500	8,730	8,730	4,150	850	435	295	355	355	2,970	675
26	6,600	7,800	7,200	8,960	3,850	790	435	295	390	355	1,220	625
27	5,230	6,000	6,600	8,730	3,400	790	435	295	355	355	790	625
28	4,700	5,600	6,200	8,730	3,250	790	390	295	355	355	730	625
29	4,550	.....	5,800	7,200	3,110	730	390	295	355	355	625	625
30	4,200	.....	5,600	6,400	2,970	730	390	295	355	355	575	625
31	4,050	.....	6,200	.....	2,970	.....	390	295	.....	355	.....	575

NOTE.—Daily discharge Jan. 1 to Feb. 26 determined by the indirect method for shifting channels. Discharge for the remainder of the year determined from a rating curve well defined below 7,600 second feet. Discharge estimated or interpolated for days of missing gage heights.

Monthly discharge of Yuba River near Smartsville, Cal., for 1910.

[Drainage area, 1,220 square miles.]

Month.	Discharge in second-feet.			Per square mile.	Run off.		Accuracy.
	Maximum.	Minimum.	Mean.		Depth in inches on drainage area.	Total in acre-feet).	
January	13,000	2,400	4,520	3.70	4.27	278,000	B.
February	10,500	3,120	4,390	3.60	3.75	244,000	B.
March	16,100	5,600	8,170	6.70	7.72	502,000	B.
April	9,890	6,400	7,900	6.48	7.23	470,000	B.
May	7,000	2,970	4,690	3.84	4.43	288,000	A.
June	2,830	730	1,280	1.05	1.17	76,200	A.
July	730	390	525	.430	.50	32,300	A.
August	390	295	328	.269	.31	20,200	A.
September	1,220	295	383	.314	.35	22,800	A.
October	675	320	388	.318	.37	23,900	A.
November	2,970	355	653	.535	.60	38,900	A.
December	8,500	525	1,400	1.15	1.33	86,100	A.
The year	16,100	295	2,880	2.36	32.03	2,080,000	

NORTH FORK OF YUBA RIVER AT GOODYEAR BAR, CAL.[1]

This station, which is located at the highway bridge at Goodyear Bar, in the E. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., was established October 31, 1910.

[1] This stream is locally known as North Yuba River.

The first important tributary above the station is the North Fork of the North Fork at Downieville, 4 miles upstream. Rock Creek enters about one-eighth mile and Goodyear Creek about one-fourth mile below the station.

In the early days Goodyear Bar and Downieville were large placer-mining camps. At Downieville the entire low-water flow of the North Fork was diverted into a flume which extended along the side of the canyon for several miles. Each miner connected with this enterprise was allotted 30 feet of the river channel, which was carefully worked to bedrock. This section of the North Yuba was one of the richest placer districts in California. There is now considerable activity in quartz mining in this district.

The gage at this station is a vertical staff in two sections on the left bank: The low-water section is fastened to the old piling under the bridge, and the main gage is fastened to the left pier.

Discharge measurements are made from the bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of Yuba River at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 14[a]	T. W. Norcross	72	100	[b] 3.41	143
Oct. 31[c]	McGlashan and Wood	70	112	3.39	146
Dec. 8	F. G. Wood	71	157	3.85	330
Dec. 9	....do	83	219	4.66	826

[a] Made by wading 300 feet above bridge.
[b] Water surface referenced and later gage height was determined.
[c] Made from downstream side of bridge.

Daily gage height, in feet, of North Fork of Yuba River at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1		3.4		11		3.5	5.3	21		3.6	3.85
2		3.4		12		3.5	4.5	22		3.6	3.8
3		3.4	5.2	13		3.5	4.0	23		4.2	3.8
4		3.4		14		3.5	4.0	24			3.8
5		3.4		15		3.5	3.9	25			3.75
6		3.45	3.8	16		3.5	3.9	26			3.7
7			3.8	17		3.55	3.9	27		3.6	3.7
8		3.48	4.0	18		3.55	3.9	28			3.75
9		3.55	4.6	19		3.6	3.85	29			3.7
10		3.5	4.7	20		3.6	3.85	30		3.4	3.7
								31		3.39		3.7

OREGON CREEK NEAR NORTH SAN JUAN, CAL.

This station, which is located 150 feet below the highway bridge, one-half mile from Freeman's Crossing, 3½ miles from North San Juan, in the N. ½ SE. ¼ sec. 28, T. 18 N., R. 8 E., in the Tahoe National Forest, was established October 28, 1910.

The gage is a vertical staff, fastened to an alder on the right bank, 150 feet below the bridge and about 500 feet above the mouth of the stream.

As a car and cable have not yet been installed the discharge measurements are made by wading or from the highway bridge.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Oregon Creek near North San Juan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 28	McGlashan and Wood	36	20	3.73	8.4
Dec. 6	F. G. Wood	41	22	3.99	20
11	.....do	81	90	4.81	139

NOTE.—All measurements made by wading.

Gage height of Oregon Creek near North San Juan, Cal., for 1910.

[C. E. Whittum, observer.]

	Feet.
Oct. 28	3.73
Nov. 5	3.7
11	5.1
20	3.9
Dec. 5	4.1
19	5.1
31	4.1

NORTH FORK OF NORTH FORK OF YUBA RIVER AT DOWNIEVILLE, CAL.[1]

This station, which is located in the NE. ¼ NW. ¼ sec. 35, T. 20 N., R. 10 E., in the Tahoe National Forest, at upper highway bridge in Downieville, 500 feet above the dam and one-fourth mile above the mouth of the river, was established November 1, 1910.

The principal tributaries of this stream are Rattlesnake Creek, Middle Fork, and East Fork, all of which enter above the station.

A small ditch, which furnishes water for domestic uses at Downieville, heads above the station.

The gage is a vertical staff fastened to the left face of the right pier of the highway bridge.

[1] This stream is locally known as North Fork of North Yuba River.

Discharge measurements are made from this bridge also from the bridge near the mouth.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of North Fork of North Fork of Yuba River at Downieville, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 16[a]	T. W. Norcross	71	163	(b)	189
Nov. 1[c]	McGlashan and Wood	47	57	2.67	48
Dec. 9[a]	F. G. Wood	70	202	3.64	440

[a] Made from upstream side of lower bridge near mouth in Downieville.
[b] Water surface 20.52 feet below center of nail driven into top board on guard rail fence 48 feet from edge of right pier, upstream side of bridge.
[c] Made by wading about 800 feet above gage.

Daily gage height, in feet, of North Fork of North Fork of Yuba River at Downieville, Cal., for 1910.

[John T. Mason, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.67	2.70	11	2.80	3.80	21	2.60	2.90
2	2.67	2.70	12	2.98	3.40	22	2.60	2.90
3	2.70	3.75	13	2.75	3.20	23	3.50	2.85
4	2.70	3.25	14	2.65	3.15	24	3.00	2.85
5	2.65	3.05	15	2.65	3.05	25	3.10	2.85
6	2.67	3.00	16	2.68	3.05	26	3.00	2.83
7	2.67	3.00	17	2.60	3.05	27	2.80	2.80
8	2.80	3.35	18	2.87	3.03	28	2.70	2.80
9	2.74	3.62	19	2.73	3.00	29	2.70	2.80
10	2.70	3.55	20	2.60	2.90	30	2.70	2.80
						31	.....	2.77

ROCK CREEK AT GOODYEAR BAR, CAL.

This station, which is located near the footbridge at Goodyear Bar, in the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in the Tahoe National Forest, was established October 30, 1910.

The principal tributary is Woodruff Creek, which enters 350 feet above the station and about 600 feet above the mouth.

Three small ditches, having a total capacity of about 10 second-feet, head above the station. Two of these, Paul Bachel's ditch and William's ditch, divert water from Woodruff Creek about one-fourth mile above its junction with Rock Creek. The intake of the Kennedy ditch is about three-fourths mile above the mouth of Rock Creek. Paul Bachel's ditch, which supplies water for domestic use in the town of Goodyear Bar, carried 0.69 second-foot on October 31 and 0.96 second-foot on December 8, 1910.

The gage is a vertical staff fastened to an alder on the right bank.

Discharge measurements are made from the bridge 40 feet above the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Rock Creek at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Sept. 14	T. W. Norcross	5	2.0	(a)	0.6
Oct. 31	McGlashan and Wood	8	5.4	2.36	2.0
Dec. 8	F. G. Wood	7.5	6.6	2.48	4.9

a Reference point to water surface 9.96 feet. Reference point is chalked arrow on top of plank on footbridge, upstream side.

NOTE.—All measurements made by wading in the vicinity of the gage.

Daily gage height, in feet, of Rock Creek at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	2.37	.....	11	.....	2.6	3.3	21	.....	2.6	2.65
2	.....	2.37	.....	12	.....	2.55	2.9	22	.....	2.6	2.6
3	.....	2.37	3.4	13	.....	2.55	2.9	23	.....	2.5	2.6
4	.....	2.4	.....	14	.....	2.55	2.8	24	.....	.....	2.6
5	.....	2.4	.....	15	.....	2.55	2.8	25	.....	.....	2.55
6	.....	2.4	2.5	16	.....	2.55	2.7	26	.....	.....	2.5
7	.....	2.4	2.5	17	.....	2.6	2.7	27	.....	2.4	2.5
8	.....	2.5	2.5	18	.....	2.6	2.7	28	.....	.....	2.5
9	.....	2.55	2.6	19	.....	2.6	2.65	29	.....	.....	2.5
10	.....	2.6	2.7	20	.....	2.6	2.65	30	2.37	2.3	2.5
								31	2.37	.....	2.5

GOODYEAR CREEK AT GOODYEAR BAR, CAL.

This station, which is located at the trail bridge, one-fourth mile north of the North Yuba bridge in the W. ½ SW. ¼ sec. 5, T. 19 N., R. 10 E., in the Tahoe National Forest, on October 30, 1910.

Although only about 300 feet above the mouth of the creek, the gage is believed to be above backwater from the North Yuba.

Three small ditches, having a total maximum capacity of about 7½ second-feet, head above the station. One of these, Andrew Bachel's ditch, diverts water from the main creek about 1 mile above the mouth. Of the others, the Morgan-Casserly ditch takes water from Eureka Creek 3½ miles above its mouth, and the Casserly ditch from Collins Ravine 2½ miles above its mouth.

The gage is a vertical staff, fastened to an alder on the left bank.

Discharge measurements are made from the bridge, 200 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Goodyear Creek at Goodyear Bar, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 31[a]	H. D. McGlashan	18	6.1	1.60	5.8
Dec. 8	F. G. Wood	24	19	1.75	14

[a] Measurement made by wading. Andrew Bachel's ditch dry.

Daily gage height, in feet, of Goodyear Creek at Goodyear Bar, Cal., for 1910.

[Walter S. Barton, observer.]

Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.	Day.	Oct.	Nov.	Dec.
1	.....	1.6	.....	11	.....	1.65	2.5	21	.....	1.65	1.85
2	.....	1.6	.....	12	.....	1.65	2.1	22	.....	1.65	1.9
3	.....	1.6	3.2	13	.....	1.65	2.1	23	.....	1.9	1.85
4	.....	1.6	.....	14	.....	1.65	2.0	24	.....	.....	1.8
5	.....	1.6	.....	15	.....	1.6	2.0	25	.....	.....	1.8
6	.....	1.6	1.8	16	.....	1.6	1.9	26	.....	.....	1.75
7	.....	1.6	1.8	17	.....	1.6	1.9	27	.....	1.7	1.75
8	.....	1.65	1.8	18	.....	1.6	1.9	28	.....	.....	1.7
9	.....	1.7	1.9	19	.....	1.65	1.9	29	.....	.....	1.7
10	.....	1.7	2.0	20	.....	1.65	1.85	30	.....	1.6	1.7
								31	.....	1.6	.....	1.7

BEAR RIVER AT VAN TRENT, CAL.[1]

This station, which is located in the SE. ¼ sec. 21, T. 14 N., R. 6 E., about 800 feet below the bridge near the Dairy Farm mine, Van Trent post office, and 8 miles above Wheatland, was established October 8, 1904, to obtain data regarding the run-off from a deforested drainage basin.

No tributaries enter near the station. Wolf Creek, which enters from the north about 20 miles above, drains about 76 square miles. Rock Creek, a very small stream, enters about 1 mile below. Some water is stored on the headwaters of Bear River, and water is also diverted from the South Fork of Yuba River to this basin. Hence the records at this station do not show the natural run-off from the basin. During the low-water period nearly the entire flow is used for irrigation above the station.

[1] Formerly known as "above Wheatland." Van Trent is a new post office.

The staff gage, the datum of which has not been changed since the station was established, is in three sections on the left bank about 600 feet below the bridge.

In November, 1909, the car and cable were removed; since then measurements have been made by wading.

The rough channel and the torrential nature of the stream render conditions for obtaining accurate discharge data poor. The low-water portion of the 1909 curve has been slightly revised for 1910.

The following discharge measurement was made by J. E. Stewart by wading:

August 4, 1910: Width, 35 feet; area, 24 square feet; gage height, 0.96 foot; discharge, 26 second-feet.

Daily gage height, in feet, of Bear River at Van Trent, Cal., for 1910.

[Hermann Ernestus, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.9	4.2	3.6	2.9	2.0	1.3	1.0	0.9	0.8	0.9	1.0	1.1
2	5.5	3.4	3.5	2.8	2.0	1.3	1.0	.8	.8	.9	1.1	1.1
3	3.8	3.3	3.4	2.8	1.9	1.3	1.0	.9	.8	.9	1.1	1.3
4	3.5	3.2	3.4	2.7	2.0	1.3	1.0	.9	.8	.9	1.1	2.3
5	3.3	3.1	3.3	2.7	1.9	1.3	1.0	.9	.8	.9	1.1	1.5
6	3.2	3.0	3.3	2.6	1.9	1.3	1.0	.9	.8	.9	1.1	1.4
7	3.2	3.2	3.2	2.6	1.8	1.2	.9	.9	.8	.9	1.0	1.3
8	3.1	3.3	3.1	2.5	1.7	1.2	.9	.9	.8	.9	1.0	1.3
9	3.1	3.2	3.1	2.5	1.7	1.2	.9	.9	.8	.9	1.2	1.3
10	3.3	3.5	3.1	2.5	1.9	1.2	.9	.9	.8	.9	1.2	1.3
11	3.2	3.3	3.1	3.0	1.7	1.2	.9	.9	.8	.9	1.1	3.8
12	3.1	3.2	3.0	2.6	1.7	1.2	.9	.9	.8	1.4	1.1	2.1
13	3.0	3.1	3.0	2.5	1.6	1.2	.9	.9	.8	1.4	1.1	1.7
14	4.1	3.2	3.0	2.4	1.6	1.2	.9	.9	.8	1.2	1.1	1.6
15	5.2	3.2	3.0	2.4	1.5	1.2	.9	.9	.9	1.1	1.1	1.5
16	4.7	3.1	2.9	2.3	1.6	1.1	.9	.8	1.35	1.1	1.1	1.4
17	4.1	3.0	2.9	2.3	1.5	1.1	.9	.9	1.2	1.1	1.1	1.4
18	3.6	2.9	2.9	2.3	1.4	1.1	.9	.9	1.0	1.1	1.1	1.4
19	3.4	5.3	3.3	2.2	1.4	1.1	.9	.9	.9	1.1	1.3	1.3
20	3.2	4.1	4.8	2.2	1.4	1.1	.9	.9	.9	1.1	1.2	1.3
21	3.1	3.6	7.0	2.1	1.4	1.1	.9	.9	.9	1.1	1.1	1.3
22	3.2	3.4	5.3	2.1	1.5	1.1	.9	.9	.9	1.1	1.1	1.3
23	3.6	4.0	7.1	2.1	1.4	1.1	.9	.8	.9	1.1	1.1	1.3
24	7.45	3.7	4.9	2.0	1.4	1.1	.9	.9	.9	1.0	1.1	1.3
25	5.2	5.1	4.1	1.9	1.3	1.1	.9	.9	.9	1.0	1.2	1.3
26	4.4	4.3	3.7	1.9	1.5	1.0	.9	.8	.9	1.0	1.5	1.2
27	4.1	3.9	3.4	1.9	1.3	1.0	.9	.8	.9	1.0	1.2	1.2
28	3.8	3.7	3.3	2.35	1.3	1.0	.8	.8	.9	1.0	1.2	1.2
29	3.6	.....	3.1	2.2	1.3	1.0	.9	.8	.9	1.0	1.2	1.2
30	3.5	.....	3.0	2.0	1.3	1.0	.9	.8	.9	1.0	1.1	1.2
31	3.4	.....	2.9	.....	1.3	.....	.9	.8	.....	1.0	.....	1.3

Daily discharge, in second-feet, of Bear River at Van Trent, Cal., for 1910.

ay.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	2,670	971	709	452	201	66	32	23	16	23	32	42
.....	1,660	632	670	420	201	66	32	16	16	23	42	42
.....	791	594	632	420	178	66	32	23	16	23	42	53
.....	670	557	632	390	201	66	32	23	16	23	42	276
.....	594	521	594	390	178	66	32	23	16	23	42	97
.....	557	486	594	361	178	66	32	23	16	23	42	81
.....	557	557	557	361	156	53	23	23	16	23	32	66
.....	521	594	521	332	135	53	23	23	16	23	32	66
.....	521	557	521	332	135	53	23	23	16	23	53	66
.....	594	670	521	332	178	53	23	23	16	23	53	66
.....	557	594	521	486	135	53	23	23	16	23	42	791
.....	521	557	486	361	135	53	23	23	16	81	42	225
.....	486	521	486	332	115	53	23	23	16	81	42	135
.....	925	557	486	303	115	53	23	23	16	53	42	115
.....	1,480	557	486	303	97	53	23	23	23	42	42	97
.....	1,210	521	452	276	115	42	23	16	74	42	42	81
.....	925	486	452	276	97	42	23	23	53	42	42	81
.....	709	452	452	276	81	42	23	23	32	42	42	81
.....	632	1,540	594	250	81	42	23	23	23	42	66	66
.....	557	925	1,260	250	81	42	23	23	23	42	53	66
.....	521	709	2,750	225	81	42	23	23	23	42	42	66
.....	557	632	1,540	225	97	42	23	23	23	42	42	66
.....	709	880	2,830	225	81	42	23	16	23	42	42	66
.....	3,140	749	1,320	201	81	42	23	23	23	32	42	66
.....	1,480	1,430	925	178	66	42	23	23	23	32	53	66
.....	1,060	1,020	749	178	97	32	23	16	23	32	97	53
.....	925	835	632	178	66	32	23	16	23	32	53	53
.....	791	749	594	290	66	32	16	16	23	32	53	53
.....	709	.....	521	250	66	32	23	16	23	32	53	53
.....	670	.....	486	201	66	32	23	16	23	32	42	53
.....	632	.....	452	.....	66	.....	23	16	.....	32	.....	53

.—Daily discharge determined from a discharge rating curve fairly well defined.

Monthly discharge of Bear River at Van Trent, Cal., for 1910.

[Drainage area, 263 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
r.....	3,140	521	914	3.48	4.01	56,200	C.
ry.....	1,540	452	709	2.70	2.81	39,400	C.
.....	2,830	452	788	3.00	3.46	48,500	C.
.....	486	178	302	1.15	1.28	18,000	C.
.....	201	66	117	.445	.51	7,190	B.
.....	66	32	48.4	.184	.21	2,880	B.
.....	32	16	24.5	.093	.11	1,510	B.
.....	23	16	21.0	.080	.09	1,290	B.
ber.....	74	16	22.7	.086	.10	1,350	B.
.....	81	23	35.5	.135	.16	2,180	B.
ber.....	97	32	46.2	.176	.20	2,750	B.
er.....	791	42	105	.399	.46	6,460	B.
ne year.....	3,140	16	259	.985	13.40	188,000	

AMERICAN RIVER BASIN.

AMERICAN RIVER NEAR FAIROAKS, CAL.

American River drains an area comprising about 2,000 square miles lying on the western slope of the Sierra, south of Bear and Yuba River basins, west of Lake Tahoe and the Truckee River basin, and north of the Cosumnes and Mokelumne River basins.

The river is formed by the union of three principal forks, which rise in the high Sierra at an altitude of 9,000 to 10,000 feet. North and Middle forks drain areas of 349 and 640 square miles, respectively. Each is about 60 miles long and has a total fall of nearly 8,000 feet. South Fork is also 60 miles long, falls nearly 9,000 feet, and drains an area comprising 861 square miles. North and Middle forks unite near Auburn, about 20 miles above the mouth of South Fork, which is only a few miles above Folsom. Each of the forks has many other forks, branches and tributaries. The river flows southwestward to its junction with the Sacramento.

The gaging station, which is located in the San Juan land grant at the Fairoaks highway bridge, about 1,000 feet north of the railroad station, was established November 3, 1904.

No important tributaries enter American River above or below Fairoaks, except the South Fork, which joins the main stream about 3 miles above Folsom and about 10 miles above the station.

The discharge from the South Fork of American River is affected by storage from Silver Lake and Echo Lake and by water diverted from the North Fork of Cosumnes River basin. The natural outlet of Echo Lake is into the Lake Tahoe drainage basin. By a court decree, the Sierra Water Supply Co. has secured permission to turn the water into the American River basin.

Water is diverted also above Placerville just below the mouth of Silver Fork for irrigation, mining, power, and municipal supply.

The position of the gage has been changed several times during the continuance of the station, but no change has been made in the datum. The present gage is located on the right bank at the highway bridge. A low-water staff gage is fastened to a pile 10 feet below the concrete pier on which the upper section of the gage is painted.

The old bridge was destroyed by flood in March, 1907, after which time measurements were made from a temporary bridge until the end of 1908. This temporary bridge was washed out January 13, 1909. A new steel bridge was completed early in 1909, and measurements are now made from it except at low water, when wading measurements can be made.

The current is sluggish at low water and swift at medium and high stages. During floods the river overflows the left bank for several

hundred feet, but all the water passes under the bridge. On account of this increase in the width of the stream the mean velocity tends to decrease at extreme high water and hence fairly good flood measurements may be made.

The rating curve for 1910 is well defined and the estimates may be considered excellent.

Discharge measurements of American River near Fairoaks, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 17	J. E. Stewart	353	1,920	5.58	6,020
Mar. 10	do	358	2,330	6.65	8,660
24	do	363	2,820	8.60	15,000
May 23	do	353	1,750	5.60	6,010
July 1	do	307	741	2.70	898
12	do	283	657	2.35	572
Aug. 7[a]	W. V. Hardy	170	119	1.71	184
Oct. 25[a]	J. E. Stewart	125	154	2.01	332

[a] Measurement made by wading.

Daily gage height, in feet, of American River near Fairoaks, Cal., for 1910.

[M. J. Ferry, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	9.8	5.3	6.4	6.7	6.8	5.5	2.5	2.0	1.7	1.8	2.2	2.5
2	9.7	5.2	6.2	6.9	6.7	5.3	2.5	2.0	1.7	1.9	2.2	2.5
3	8.7	5.3	6.4	6.8	6.5	5.2	2.6	1.9	1.7	1.9	2.3	2.5
4	8.3	5.4	6.6	6.8	6.4	5.0	2.6	1.8	1.7	1.9	2.3	2.9
5	7.9	6.3	6.6	6.7	6.2	4.8	2.5	1.8	1.7	2.0	2.3	5.0
6	7.5	6.2	6.5	6.7	6.0	4.6	2.4	1.8	1.7	2.1	2.2	5.1
7	7.3	5.4	6.5	6.8	6.0	4.3	2.2	1.8	1.7	2.0	2.2	4.5
8	6.9	5.2	6.4	7.0	6.1	4.2	2.3	1.7	1.8	2.1	2.3	4.0
9	5.9	5.0	6.6	7.4	6.2	3.9	2.2	1.7	1.8	2.0	2.3	3.8
10	5.3	4.8	6.6	7.7	6.4	3.7	2.3	1.8	1.7	1.9	2.3	3.2
11	4.8	4.7	6.8	7.9	6.5	3.6	2.3	1.8	1.7	1.9	2.2	3.4
12	4.6	4.6	6.7	6.9	6.6	3.6	2.2	1.7	1.7	1.9	2.2	3.7
13	4.5	4.5	6.8	6.7	6.6	3.6	2.3	1.7	1.8	2.0	2.2	3.6
14	4.4	4.5	6.9	6.9	6.7	3.5	2.3	1.7	1.7	1.9	2.2	3.5
15	4.9	4.6	6.6	7.2	6.7	3.5	2.3	1.8	1.7	2.0	2.3	3.4
16	5.9	4.7	6.4	7.4	6.8	3.5	2.2	1.8	1.8	2.1	2.3	3.4
17	6.5	4.6	6.1	7.5	6.8	3.4	2.3	1.8	1.7	2.1	2.3	3.3
18	5.3	5.6	6.8	7.6	6.8	3.3	2.3	1.7	1.7	2.1	2.3	3.2
19	4.8	5.5	9.1	7.7	6.8	3.2	2.2	1.7	1.7	2.2	2.3	3.2
20	5.4	5.4	10.3	7.7	6.7	3.2	2.2	1.8	1.7	2.1	2.4	3.1
21	5.8	5.1	10.1	7.9	6.6	3.1	2.2	1.7	1.7	2.0	2.4	3.1
22	6.3	5.1	9.7	7.8	6.7	3.1	2.2	1.7	1.7	2.0	2.4	3.0
23	8.1	5.2	9.3	7.7	6.7	3.0	2.3	1.8	1.8	2.0	2.4	2.9
24	9.5	5.3	8.5	7.7	6.5	3.0	2.3	1.7	1.8	1.9	2.4	2.8
25	6.5	5.6	7.3	7.6	6.2	2.8	2.2	1.8	1.8	1.9	2.4	2.7
26	6.3	5.6	7.1	7.8	6.1	2.7	2.2	1.7	1.8	2.0	2.4	2.6
27	5.8	5.7	6.9	7.7	6.0	2.6	2.3	1.8	1.8	2.1	2.4	2.5
28	5.5	6.6	6.8	7.3	5.8	2.6	2.1	1.7	1.8	2.1	2.4	2.5
29	5.5	.....	6.6	7.0	5.7	2.5	2.1	1.7	1.9	2.2	2.4	2.4
30	5.6	.....	6.5	6.8	5.6	2.5	2.0	1.7	1.9	2.2	2.5	2.4
31	5.5	.....	6.7	.....	5.6	.....	2.0	1.8	.....	2.2	.....	2.3

Daily discharge, in second-feet, of American River near Fairoaks, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	19,600	5,320	7,950	8,780	9,060	5,780	690	330	180	225	455	690
2	19,200	5,100	7,450	9,340	8,780	5,320	690	330	180	275	455	690
3	15,300	5,320	7,950	9,060	8,220	5,100	780	275	180	275	525	690
4	13,800	5,550	8,500	9,060	7,950	4,660	780	225	180	275	525	1,100
5	12,400	7,700	8,500	8,780	7,450	4,220	690	225	180	330	525	4,660
6	11,100	7,450	8,220	8,780	6,970	3,800	605	225	180	390	455	4,880
7	10,500	5,550	8,220	9,060	6,970	3,220	455	225	180	330	455	3,600
8	9,340	5,100	7,950	9,620	7,210	3,040	525	180	225	390	525	2,690
9	6,730	4,660	8,500	10,800	7,450	2,520	455	180	225	330	525	2,360
10	5,320	4,220	8,500	11,800	7,950	2,200	525	225	180	275	525	1,460
11	4,220	4,000	9,060	12,400	8,220	2,050	525	225	180	275	455	1,750
12	3,800	3,800	8,780	9,340	8,500	2,050	455	180	180	275	455	2,200
13	3,600	3,600	9,060	8,780	8,500	2,050	525	180	225	330	455	2,050
14	3,410	3,600	9,340	9,340	8,780	1,900	525	180	180	275	455	1,900
15	4,440	3,800	8,500	10,200	8,780	1,900	525	225	180	330	525	1,750
16	6,730	4,000	7,950	10,800	9,060	1,900	455	225	225	390	525	1,750
17	8,220	3,800	7,210	11,100	9,060	1,750	525	225	180	390	525	1,600
18	5,320	6,010	9,060	11,500	9,060	1,600	525	180	180	390	525	1,460
19	4,220	5,780	16,800	11,800	9,060	1,460	455	180	180	455	525	1,460
20	5,550	5,550	21,700	11,800	8,780	1,460	455	225	180	390	605	1,340
21	6,490	4,880	20,800	12,400	8,500	1,340	455	180	180	330	605	1,340
22	7,700	4,880	19,200	12,100	8,780	1,340	455	180	180	330	605	1,220
23	13,100	5,100	17,600	11,800	8,780	1,220	525	225	225	330	605	1,100
24	18,400	5,320	14,500	11,800	8,220	1,220	525	180	225	275	605	985
25	8,220	6,010	10,500	11,500	7,450	985	455	225	225	275	605	875
26	7,700	6,010	9,920	12,100	7,210	875	455	180	225	330	605	780
27	6,490	6,250	9,340	11,800	6,970	780	525	225	225	390	605	690
28	5,780	8,500	9,060	10,500	6,490	780	390	180	225	390	605	690
29	5,780	.....	8,500	9,620	6,250	690	390	180	275	455	605	605
30	6,010	.....	8,220	9,060	6,010	690	330	180	275	455	690	605
31	5,780	.....	8,780	.....	6,010	.....	330	225	.....	455	.....	525

NOTE.—Daily discharges determined from a well-defined discharge rating curve.

Monthly discharge of American River near Fairoaks, Cal., for 1910

[Drainage area, 1,910 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	19,600	3,410	8,520	4.46	5.14	524,000	A.
February	8,500	3,600	5,240	2.74	2.85	291,000	A.
March	21,700	7,210	10,500	5.50	6.34	646,000	A.
April	12,400	8,780	10,500	5.50	6.14	625,000	A.
May	9,060	6,010	7,950	4.16	4.80	489,000	A.
June	5,780	690	2,260	1.18	1.32	134,000	A.
July	780	330	516	.270	.31	31,700	A.
August	330	180	213	.112	.13	13,100	A.
September	275	180	201	.105	.12	12,000	A.
October	455	225	342	.179	.21	21,000	A.
November	690	455	538	.282	.31	32,000	A.
December	4,880	525	1,600	.838	.97	98,400	A.
The year	21,700	180	4,030	2.11	28.64	2,920,000	

CACHE CREEK BASIN.

GENERAL FEATURES.

The Cache Creek, the only known outlet of Clear Lake, drains an area comprising 1,290 square miles, lying on the eastern slope of the Coast Range in Lake, Colusa, and Yolo Counties, immediately south

and west of the south end of the Stony Creek basin and north of the Putah Creek basin.

From the lake Cache Creek flows southeastward to Yolo basin and ultimately discharges into Sacramento River through sloughs. Its total length is about 80 miles.

The largest and most important tributary of Cache Creek is the North Fork, which drains 250 square miles in the eastern part of Lake County. The only other tributary of much importance is Bear Creek, which drains the western part of Colusa County. These creeks are very small in the summer, but rarely become dry. All the tributaries are torrential.

CACHE CREEK AT LOWER LAKE, CAL.

This station was established January 1, 1901, to determine the outflow of Clear Lake. The gage and measuring section were originally located at the wagon bridge just below the outlet of Clear Lake, about 1 mile from Lower Lake, Cal., and below Siegler Creek. On March 26, 1903, a cable was installed 300 feet above the bridge and above Siegler Creek, and a new staff gage was set 100 feet above the cable on the left bank in the SE. ¼ SE. ¼ sec. 34, T. 13 N., R. 7 W. On March 26, when this gage was set, the reading was 5.7 feet, the old gage reading being 4.4 feet. The gage is read daily. The gage datum has remained unchanged.

No tributaries enter above the station except those which come into Clear Lake. Siegler Creek enters about 300 feet below the station. North Fork joins the main creek about 14 miles below the lake.

The flow at the station is regulated by Clear Lake, which diminishes the intensity of floods and prolongs the summer flow.

Conditions at this station are peculiar. The stream bed at this point forms a gravel bank which controls the outlet of Clear Lake. The grade of the creek down to Siegler Creek is small. When Cache Creek is low and Siegler Creek high, the current of Cache Creek is reversed, and part of the water from Siegler Creek finds its way upstream into Clear Lake, the rest flowing downstream into Cache Creek. This phenomenon happens at extreme flood stages and causes backwater at the gage above the cable. The flow from Siegler Creek is very small, except at these flood periods, which are usually of short duration.

No discharge measurements were made during 1910. As the channel is firm gravel, it is practically permanent and the records are considered good.

Daily gage height, in feet, of Cache Creek at Lower Lake, Cal., for 1910.

[J. R. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	3.6	4.7	5.05	5.45	4.85	4.15	3.6	3.05	2.5	2.2	1.9	1.85
2	3.6	4.6	5.05	5.45	4.85	4.15	3.55	3.05	2.5	2.15	1.9	1.9
3	3.55	4.5	5.05	5.4	4.8	4.15	3.55	3.05	2.5	2.15	1.9	1.9
4	3.55	4.6	5.1	5.4	4.8	4.15	3.5	3.0	2.5	2.1	1.9	1.95
5	3.55	4.6	5.1	5.4	4.75	4.1	3.45	3.0	2.5	2.1	1.9	1.95
6	3.6	4.55	5.05	5.4	4.75	4.05	3.45	3.0	2.5	2.05	1.9	1.9
7	3.6	4.6	5.1	5.35	4.75	4.0	3.45	3.0	2.45	2.05	1.9	1.9
8	3.55	4.7	5.05	5.35	4.75	4.0	3.4	2.95	2.45	2.1	1.9	1.9
9	3.5	4.75	5.05	5.3	4.7	4.0	3.4	2.95	2.45	2.05	1.9	1.9
10	3.55	4.75	5.0	5.2	4.7	3.95	3.4	2.95	2.4	2.1	1.9	1.9
11	3.55	4.8	5.0	5.25	4.65	3.95	3.4	2.95	2.4	1.9	1.9	1.95
12	3.55	4.8	5.0	5.35	4.65	4.0	3.35	2.9	2.35	1.95	1.95	1.95
13	3.35	4.8	4.95	5.3	4.65	4.0	3.35	2.9	2.3	2.05	1.9	1.95
14	3.6	4.85	5.0	5.25	4.6	3.9	3.3	2.9	2.25	2.05	1.95	1.95
15	3.8	4.8	4.95	5.25	4.55	3.9	3.3	2.9	2.35	2.05	1.85	2.0
16	3.8	4.8	4.95	5.2	4.5	3.85	3.3	2.85	2.3	2.05	1.85	2.0
17	3.85	4.8	4.95	5.2	4.5	3.85	3.25	2.85	2.25	2.0	1.85	1.95
18	3.85	4.8	4.95	5.2	4.5	3.85	3.25	2.8	2.2	2.0	1.9	1.9
19	3.85	4.8	4.95	5.15	4.5	3.8	3.25	2.8	2.25	1.95	1.9	1.9
20	3.9	4.8	5.0	5.15	4.4	3.8	3.2	2.8	2.25	1.95	1.85	1.9
21	3.9	4.8	5.05	5.1	4.4	3.8	3.2	2.8	2.2	2.0	1.8	1.95
22	3.95	4.9	5.3	5.1	4.4	3.75	3.2	2.8	2.2	2.0	1.85	1.9
23	4.0	4.85	5.25	5.05	4.35	3.75	3.15	2.75	2.2	1.95	1.8	1.9
24	4.35	4.85	5.25	5.0	4.35	3.7	3.15	2.75	2.2	1.95	1.8	1.9
25	4.3	4.9	5.25	5.05	4.3	3.7	3.15	2.75	2.2	1.95	1.95	1.9
26	4.4	4.9	5.2	5.0	4.3	3.65	3.1	2.75	2.2	1.95	1.85	1.9
27	4.5	5.0	5.65	4.95	4.3	3.7	3.1	2.7	2.15	1.95	1.8	1.9
28	4.55	5.05	5.4	4.95	4.25	3.65	3.1	2.65	2.15	1.95	1.85	1.9
29	4.6	.....	5.4	4.95	4.25	3.6	3.1	2.6	2.15	1.95	1.85	1.85
30	4.6	.....	5.4	4.9	4.25	3.6	3.1	2.55	2.15	1.95	1.85	1.9
31	4.6	.....	5.4	.....	4.2	.....	3.1	2.5	.....	1.95	.....	1.9

Daily discharge, in second-feet, of Cache Creek at Lower Lake, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	202	444	534	645	482	314	202	104	37	12	5	4.5
2	202	419	534	645	482	314	192	104	37	10	5	5
3	192	395	534	631	469	314	192	104	37	10	5	5
4	192	419	547	631	469	314	183	97	37	8	5	5.5
5	192	419	547	631	456	303	174	97	37	8	5	5.5
6	202	407	534	631	456	292	174	97	37	7	5	5
7	202	419	547	617	456	282	174	97	32	7	5	5
8	192	444	534	617	456	282	164	90	32	8	5	5
9	183	456	534	603	444	282	164	90	32	7	5	5
10	192	456	520	575	444	272	164	90	27	8	5	5
11	192	469	520	589	431	272	164	90	27	5	5	5.5
12	192	469	520	617	431	262	154	84	22	5.5	5.5	5.5
13	154	469	507	603	431	262	154	84	18	7	5	5.5
14	202	482	520	589	419	262	145	84	15	7	5.5	5.5
15	242	469	507	589	407	262	145	84	22	7	4.5	6
16	242	469	507	575	395	252	145	77	18	7	4.5	6
17	252	469	507	575	395	252	136	77	15	6	4.5	5.5
18	252	469	507	575	395	252	136	71	12	6	5	5
19	252	469	507	561	395	242	136	71	15	5.5	5	5
20	262	469	520	561	371	242	128	71	15	5.5	4.5	5
21	262	469	534	547	371	242	128	71	12	6	4	5.5
22	272	494	603	547	371	232	128	71	12	6	4.5	5
23	282	482	589	534	360	232	120	65	12	5.5	4.0	5
24	360	482	589	520	360	222	120	65	12	5.5	4.0	5
25	348	494	589	534	348	222	120	65	12	5.5	5.5	5
26	371	494	575	520	348	212	112	65	12	5.5	4.5	5
27	395	520	705	507	348	222	112	59	10	5.5	4.0	5
28	407	534	631	507	336	212	112	54	10	5.5	4.5	5
29	419	.....	631	507	336	202	112	48	10	5.5	4.5	4.5
30	419	.....	631	494	336	202	112	42	10	5.5	4.5	5
31	419	.....	631	.....	325	.....	112	37	.....	5.5	.....	5

NOTE.—Daily discharge determined from a rating curve fairly well defined and based on measurements made previous to 1910.

Monthly discharge of Cache Creek at Lower Lake, Cal., for 1910.

[Drainage area, 500 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	419	154	263	0.526	0.61	16,200	A.
February	534	395	462	.924	.96	25,700	A.
March	705	507	555	1.11	1.28	34,100	A.
April	645	494	576	1.15	1.28	34,300	A.
May	482	325	404	.808	.93	24,800	A.
June	314	202	259	.518	.58	15,400	A.
July	202	112	146	.292	.34	8,980	B.
August	104	37	77.6	.155	.18	4,770	B.
September	37	10	21.2	.042	.05	1,260	C.
October	12	5	6.71	.013	.02	413	C.
November	5.5	4	4.77	.0095	.01	284	C.
December	6	4.5	5.16	.010	.01	317	C.
The year	705	4	230	.460	6.25	167,000	

CACHE CREEK NEAR YOLO, CAL.

This station was established January 1, 1903, on the Río Jesús María land grant, at the old wagon bridge on the road from Woodland to Yolo, about three-fourths mile from Yolo, and about 1,000 feet above the railroad bridge. In the fall of 1904 a new bridge was constructed, and the gage record was interrupted from September 11 to October 1, 1904.

No important tributaries enter within 12 or 15 miles of the station.

Many ditches take water from Cache Creek above the station for use in irrigation around Yolo and Woodland. The irrigating ditches usually take all the late summer flow. All available water in this basin has been filed upon and all lands embraced within storage reservoirs are held in private ownership.

The original staff gage was nailed to the upstream side of the right abutment of the old wagon bridge and was read twice each day. On October 2, 1904, a new staff gage was installed. It is in four sections, three of which are above the bridge and the fourth is bolted to the face of the concrete abutment on the right bank. The datum of the gage has been unchanged during the life of the station.

Discharge measurements have been made from the downstream side of the bridge.

Considered as a whole the records from January 1, 1903, to December, 1910, are good. The bed of the stream is composed of earth and gravel and is subject to some change. The banks are steep and well wooded, and their height has been increased by levees which are overtopped at extremely high water. The current is swift at moderate and high stages. The creek is dry at the station almost every summer or fall.

Discharge measurements of Cache Creek near Yolo, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 29	J. E. Stewart	90	271	3.88	1,020
Mar. 8	do	93	227	3.31	794
22	do	106	693	7.84	3,910
May 26	do	86	90	1.88	185
July 9[a]	do	4.6	1.2	.65	1.1

[a] Measurement made by wading.

Daily gage height, in feet, of Cache Creek near Yolo, Cal., for 1910.

[Mrs. C. W. Bigelow, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	2.1	3.5	3.8	3.8	2.7	1.6	0.8
2	2.05	3.4	3.7	3.75	2.7	1.5	.75
3	2.05	3.3	3.6	3.7	2.7	1.45	.75
4	2.0	3.3	3.55	3.7	2.65	1.4	.75
5	2.0	3.25	3.5	3.6	2.6	1.35	.75
6	1.95	3.2	3.45	3.5	2.55	1.3	.75
7	1.95	3.9	3.4	3.5	2.55	1.25	.7
8	1.95	4.1	3.3	3.45	2.5	1.25	.7
9	1.95	3.6	3.25	3.4	2.45	1.2	.7
10	1.95	4.1	3.2	3.35	2.45	1.2	.7
11	1.95	3.9	3.15	3.35	2.4	1.2	.7
12	1.9	3.7	3.15	3.45	2.35	1.15	.....
13	1.9	3.6	3.15	3.4	2.35	1.15	.....
14	2.35	3.55	3.1	3.35	2.3	1.15	.....
15	3.45	3.5	3.1	3.3	2.25	1.15	.....
16	4.3	3.45	3.05	3.25	2.25	1.15	.....
17	3.75	3.4	3.05	3.2	2.2	1.1	.....
18	3.2	3.35	3.1	3.2	2.15	1.1	.....
19	2.9	3.4	3.1	3.15	2.1	1.1	.....
20	2.8	3.6	3.15	3.1	2.1	1.05	.....
21	2.75	3.5	3.7	3.1	2.05	1.0	.....
22	2.7	3.4	7.6	3.05	2.0	1.0	.....
23	3.2	3.5	5.6	3.0	2.0	.95	.....
24	8.15	3.5	4.75	3.0	1.95	.95	.....
25	6.6	4.0	4.3	2.95	1.9	.9	.....
26	5.2	4.3	4.0	2.9	1.85	.85	.....
27	4.4	4.0	4.0	2.85	1.85	.85	.....
28	4.0	3.8	5.1	2.8	1.8	.85	.....
29	3.8	.....	4.3	2.75	1.75	.8	.....
30	3.7	.....	4.05	2.75	1.75	.8	.....
31	3.6	.....	3.9	.....	1.7	.....	.....

NOTE.—Creek was dry or water standing in pools from July 12 to Dec. 31.

Daily discharge, in second-feet, of Cache Creek near Yolo, Cal., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
1	270	835	975	975	490	120	3
2	252	790	925	950	490	95	2
3	252	745	880	925	490	83	2
4	235	745	858	925	470	71	2
5	235	722	835	880	450	61	2
6	220	700	812	835	430	51	2
7	220	1,020	790	835	430	42	1
8	220	1,130	745	812	410	42	1
9	220	880	722	790	392	34	1
10	220	1,130	700	768	392	34	1
11	220	1,020	678	768	375	34	1
12	205	925	678	812	358	27	1
13	205	880	678	790	358	27	.....
14	358	858	655	768	340	27	.....
15	812	835	655	745	322	27	.....

Daily discharge, in second-feet, of Cache Creek near Yolo, Cal., for 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.
16	1,240	812	632	722	322	27	.....
17	950	790	632	700	305	20	.....
18	700	768	655	700	288	20	.....
19	570	790	655	678	270	20	.....
20	530	880	678	655	270	15	.....
21	510	835	925	655	252	10	.....
22	490	790	3,650	632	235	10	.....
23	700	835	2,060	610	235	8	.....
24	4,120	835	1,500	610	220	8	.....
25	2,850	1,080	1,240	590	205	6	.....
26	1,780	1,240	1,080	570	190	4.5	.....
27	1,300	1,080	1,080	550	190	4.5	.....
28	1,080	975	1,720	530	175	4.5	.....
29	975	.....	1,240	510	160	3	.....
30	925	.....	1,100	510	160	3	.....
31	880	.....	1,020	.....	145	.....	.....

NOTE.—Daily discharges determined from a well-defined discharge rating curve.

Monthly discharge of Cache Creek near Yolo, Cal., for 1910.

[Drainage area, 1,230 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	4,120	205	766	0.623	0.72	47,100	A.
February	1,240	700	890	.724	.75	49,400	A.
March	3,650	632	1,010	.821	.95	62,100	A.
April	975	510	727	.591	.66	43,300	A.
May	490	145	317	.258	.30	19,500	B.
June	120	3	31.3	.025	.03	1,860	B.
July	3	0	.58	.00047	.0005	36	C.
August	0	0	.0	.0	.0	0	
September	0	0	.0	.0	.0	0	
October	0	0	.0	.0	.0	0	
November	0	0	.0	.0	.0	0	
December	0	0	.0	.0	.0	0	
The year	4,120	0	309	.251	3.41	223,000	

NOTE.—No flow after July 11.

PUTAH CREEK BASIN.

PUTAH CREEK AT WINTERS, CAL.

Putah Creek drains an area comprising about 810 square miles and lying on the eastern slope of the Coast Range south of the Cache Creek basin and north of Napa Valley. It includes the southern part of Lake County, the northern half of Napa County, and small parts of Yolo and Solono counties.

The creek rises in the northwestern corner of the basin, in the St. Helena Range, and flows southeastward into the Yolo basin near Davis, and thence into Sacramento River through Cache Slough. The total length of the creek is about 80 miles. It has numerous tributaries which have a heavy flood discharge in the winter but are

practically dry during the summer. The chief tributaries are Soda Creek from the north and Pope Creek from the west.

The gaging station, which is located in the Rio de los Putos land grant, about 450 feet below the railroad bridge and 800 feet southeast of the railroad station at Winters, was established September 26, 1905.

No important tributaries enter the creek within several miles of the station. No water is diverted above the station, but a small quantity is diverted at the station for irrigation by pumping. Recent filings have been made on water in this basin, and all reservoir sites are embraced within lands held by private ownership.

The gage consists of a series of timbers painted white and located under the cable. The first or low-water section is on the right bank and is nailed vertically to the truck of a cottonwood tree; it has a range of about 6 feet. The second section is on the left bank and is nailed vertically to the stump of a cottonwood tree. The third section is an inclined rod anchored on the left bank with posts. The fourth section is on an eucalyptus tree on top of left bank. The gage has been read daily.

The channel is straight and the main portion is clear. At very high stages the water spreads out over the left bank for about 150 feet, reaching nearly to the foot of the left cable support. At ordinary stages, however, the water remains within the high banks.

Measurements are made during low water by wading at a point about 400 feet above the bridge, but at higher stages they are made by means of a car and cable. For float measurements a course 250 feet long has been marked off by setting posts painted white 250 feet above and parallel with the cable. Floats can be dropped from the railroad bridge above and timed from these posts to the cable.

The records are good except at very low stages, when, owing to the width of channel and its tendency to shift, gage heights are not a reliable index of the flow.

The 1910 rating curve developed after the January flood is fairly well defined and the estimates may be considered good.

Discharge measurements of Putah Creek at Winters, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Jan. 31	J. E. Stewart	105	191	5.82	612
Mar. 9	do	88	140	5.05	306
22	do	181	853	9.52	3,570
23	do	180	698	8.68	2,760
May 26[a]	do			4.31	57
July 10[a]	do			3.91	8.9
Aug. 3[a]	W. V. Hardy			3.85	4.8
Oct. 2[a]	W. B. Clapp			3.75	2.4
27[a]	W. V. Hardy			3.82	3.7

[a] Measurement made by wading below cable.

Daily gage height, in feet, of Putah Creek at Winters, Cal., for 1910.

[Erna Wyatt, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	5.4	5.7	5.7	5.75	4.7	4.2	4.0	3.9	3.75	3.78	3.85	3.92
.....	5.2	5.55	5.6	5.65	4.7	4.2	4.0	3.85	3.75	3.76	3.86	3.94
.....	5.05	5.45	5.45	5.6	4.7	4.2	3.95	3.85	3.8	3.76	3.88	4.02
.....	5.0	5.4	5.35	5.5	4.6	4.2	3.95	3.85	3.8	3.76	3.88	4.04
.....	4.9	5.3	5.3	5.4	4.6	4.2	3.95	3.9	3.8	3.76	3.89	4.01
.....	4.9	5.2	5.2	5.4	4.6	4.2	3.95	3.85	3.8	3.76	3.89	4.40
.....	4.85	5.9	5.2	5.3	4.6	4.1	3.9	3.9	3.8	3.78	3.89	4.30
.....	4.85	7.1	5.1	5.25	4.6	4.15	3.9	3.9	3.75	3.78	3.90	4.22
.....	4.85	6.2	5.1	5.2	4.55	4.15	3.9	3.9	3.75	3.78	3.90	4.19
.....	4.85	6.8	5.0	5.1	4.55	4.15	3.9	3.9	3.7	3.78	3.90	4.20
.....	4.9	6.2	4.9	5.2	4.55	4.1	3.9	3.9	3.7	3.80	3.90	4.20
.....	4.9	5.9	4.9	5.4	4.5	4.1	3.9	3.9	3.8	3.89	3.90	4.20
.....	4.85	5.7	.....	5.3	4.5	4.1	3.85	3.9	3.8	3.91	3.90	4.20
.....	6.4	5.6	4.9	5.2	4.5	4.1	3.85	3.9	3.8	3.89	3.90	4.30
.....	7.5	5.45	4.9	.....	4.5	4.1	3.85	3.85	3.8	3.82	3.90	4.28
.....	7.8	5.35	4.8	5.1	4.4	4.1	3.9	3.85	3.75	3.82	3.90	4.25
.....	7.2	5.3	4.8	5.0	4.4	4.1	3.9	3.85	3.75	3.81	3.90	4.21
.....	6.3	5.2	4.7	5.0	4.4	4.1	3.85	3.85	3.8	3.81	3.90	4.20
.....	5.9	5.2	4.7	4.95	4.35	4.1	3.85	3.85	3.8	3.81	3.90	4.20
.....	5.6	5.3	4.9	4.9	4.35	4.1	3.8	3.9	3.8	3.81	3.91	4.18
.....	5.4	5.2	6.4	4.9	4.35	4.1	3.8	3.8	3.8	3.80	.....	4.18
.....	5.35	5.1	10.9	4.9	4.35	4.1	3.75	3.8	3.8	3.81	3.91	4.18
.....	5.4	5.5	9.55	4.85	4.35	4.1	3.75	3.8	3.8	3.81	3.91	4.17
.....	16.8	5.5	7.3	4.8	4.3	4.05	3.9	3.75	3.8	3.81	3.90	4.15
.....	9.7	8.0	6.2	4.8	4.3	4.05	3.9	3.75	3.8	3.81	3.91	4.15
.....	.....	6.9	6.2	4.75	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.15
.....	7.2	6.2	6.2	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.15
.....	6.65	5.95	7.7	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.14
.....	6.4	.....	6.5	4.7	4.3	4.0	3.9	3.75	3.8	3.81	3.91	4.12
.....	6.0	.....	6.15	4.7	.....	4.0	3.9	3.8	3.8	3.81	3.92	4.12
.....	5.85	.....	.....	.....	4.2	.....	3.9	3.75	.....	3.81	.....	4.12

Daily discharge, in second-feet, of Putah Creek at Winters, Cal., for 1910.

)ay.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
.....	298	560	560	585	150	38	15	8	2	1.6	5.5	9.4
.....	203	485	510	535	150	38	15	5.5	2	1.2	6	11
.....	152	437	437	510	150	38	12	5.5	3	1.2	7	17
.....	137	414	392	460	122	38	12	5.5	3	1.2	7	19
.....	111	370	370	414	122	38	12	8	3	1.2	7.4	16
.....	111	328	328	414	122	38	12	5.5	3	1.2	7.4	73
.....	100	664	328	370	122	25	8	8	3	1.6	7.4	54
.....	100	1,440	289	349	122	32	8	8	2	1.6	8	41
.....	100	838	289	328	109	32	8	8	2	1.6	8	36
.....	100	1,210	252	289	109	32	8	8	1	1.6	8	38
.....	111	838	216	328	109	25	8	8	1	3	8	38
.....	111	664	216	414	96	25	8	8	3	7.4	8	38
.....	100	560	216	370	96	25	5.5	8	3	8.7	8	38
.....	1,000	510	216	328	96	25	5.5	8	3	7.4	8	54
.....	1,940	437	216	308	96	25	5.5	5.5	3	4	8	51
.....	2,200	392	182	289	73	25	8	5.5	2	4	8	46
.....	1,680	370	182	252	73	25	8	5.5	2	3.5	8	40
.....	921	328	150	252	73	25	5.5	5.5	3	3.5	8	38
.....	604	328	150	234	64	25	5.5	5.5	3	3.5	8	38
.....	408	370	182	216	64	25	3	8	3	3.5	8.7	35
.....	298	328	956	216	64	25	3	3	3	3	8.7	35
.....	272	289	4,900	216	64	25	2	3	3	3.5	8.7	35
.....	298	460	3,570	199	64	25	2	3	3	3.5	8.7	34
.....	12,000	460	1,580	182	54	20	8	2	3	3.5	8	32
.....	3,710	2,150	838	182	54	20	8	2	3	3.5	8.7	32
.....	2,700	1,280	838	166	54	15	8	2	3	3.5	8.7	32
.....	1,510	838	838	150	54	15	8	2	3	3.5	8.7	32
.....	1,110	692	1,900	150	54	15	8	2	3	3.5	8.7	30
.....	956	.....	1,020	150	54	15	8	2	3	3.5	8.7	28
.....	720	.....	808	150	46	15	8	3	3	3.5	9.4	28
.....	637	.....	695	.....	38	.....	8	2	.....	3.5	.....	28

:.—Daily discharge determined from two rating curves fairly well defined, one applicable Jan. 1 to 24) other Jan. 25 to Dec. 31.

Monthly discharge of Putah Creek near Winters, Cal., for 1910.

[Drainage area, 805 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	12,000	100	1,120	1.39	1.60	68,900	B.
February	2,150	289	644	.800	.83	35,800	A.
March	4,900	150	762	.947	1.09	46,900	A.
April	585	150	300	.373	.42	17,900	A.
May	150	38	87.7	.109	.13	5,390	A.
June	38	15	26.3	.033	.04	1,560	A.
July	15	2	7.85	.0098	.01	483	A.
August	8	2	5.27	.0065	.008	324	A.
September	3	1	2.67	.0033	.004	159	B.
October	8.7	1.2	3.24	.0040	.005	199	B.
November	9.4	5.5	7.98	.0099	.01	475	A.
December	73	9.4	34.7	.043	.05	2,130	A.
The year	12,000	1	249	.309	4.20	180,000	

NORTH PACIFIC OCEAN DRAINAGE BASINS.

RUSSIAN RIVER BASIN.

RUSSIAN RIVER AT GEYSERVILLE, CAL.

Russian River rises in the eastern part of Mendocino County on the west slope of the Coast Range and flows southeastward to its junction with Santa Rosa Creek in Sonoma County, where it turns westward and enters the canyon through which it flows to the Pacific Ocean. The total length of the main river is about 100 miles.

The principal tributaries of Russian River are East Fork, Big Sulphur Creek, Dry Creek, Santa Rosa Creek, and Austin Creek—all very small, except during the rainy season.

Russian River Valley, in Sonoma County, is fertile and well cultivated. The climate is very equable throughout the year and fruit-raising is the important industry. As the climate and soil are especially favorable for the growing of grapes, this valley has become one of the most important wine-producing districts of California.

The gaging station, which is located at the highway bridge on the Tzabaco Spanish land grant, half a mile east of Geyserville, was established December 5, 1910.

As water is diverted from the South Eel to the East Fork of Russian River for power development, the record at this station does not show the natural run-off from the basin but indicates the amount of water available for irrigation.

The gage is painted on the lower caisson of the sixth pier from the right end of the bridge.

Discharge measurements are made from the highway bridge.

The following discharge measurement was made by W. V. Hardy, from bridge:

December 4, 1910: Width, 219 feet; area, 846 square feet; gage height, 10.04 feet; discharge, 354 second-feet.

Daily gage height, in feet, of Russian River at Geyserville, Cal., for 1910.

[Elwin Smith, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.	Day.	Dec.
1.....	.....	6.....	9.92	11.....	9.96	16.....	9.89	21.....	9.75	26.....	9.55
2.....	.....	7.....	9.91	12.....	9.94	17.....	9.88	22.....	9.65	27.....	9.50
3.....	.....	8.....	9.90	13.....	9.94	18.....	9.84	23.....	9.65	28.....	9.50
4.....	10.40	9.....	9.85	14.....	9.90	19.....	9.78	24.....	9.50	29.....	9.50
5.....	9.98	10.....	9.92	15.....	9.90	20.....	9.70	25.....	9.55	30.....	9.45
										31.....	9.45

EEL RIVER BASIN.

GENERAL FEATURES.

Eel River is formed by the junction of its two headwater tributaries, South Eel and Middle Eel rivers, which rise on the west slope of the Coast Range in the California National Forest, and together with the main Eel drain parts of Lake, Trinity, Mendocino, and Humboldt counties. The principal tributaries below Two Rivers are the North Fork, South Fork, and Van Duzen rivers.

The lower portion of the drainage area, below the mouth of the South Fork, is in the redwood (*Sequoia sempervirens*) belt. The remainder of the area is semi-open and contains very little merchantable timber except on a small tract near Grizzly Mountain. The lowlands are very fertile and well cultivated. The rolling and hills lands are covered with grass and are used only for grazing.

The precipitation throughout the drainage area is very heavy during the winter months.

SOUTH EEL RIVER AT HEARST, CAL.

This station, which is located at the highway bridge at Hearst, about 3 miles below the mouth of Sanhedrin Creek, in sec. 20, T. 19 N., R. 12 W., was established December 7, 1910.

Water is diverted above the station, and is conducted through a tunnel to the basin of the East Fork of Russian River, where it is used by the Snow Mountain Power Co. for power development.

A staff gage in two sections is bolted to the bed rock on the left bank at the bridge, and a third section is painted on the lower caisson of the bridge at the left end.

Discharge measurements are made from the highway bridge.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of South Eel River at Hearst, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 13[a]	W. V. Hardy	10	3.8	(b)	4
Dec. 8[c]	do	35	33	8.45	44

[a] Made by wading 600 feet below bridge.
[b] No gage installed.
[c] Made by wading 400 feet below bridge.

Daily gage height, in feet, of South Eel River at Hearst, Cal., for 1910.

[L. S. Neighbor, observer.]

Day.	Dec.	Day.	Dec.	Day.	Dec.	Day..	Dec.	Day.	Dec.	Day.	Dec.
1		6		11	9.62	16	8.30	21	8.10	26	7.97
2		7		12	9.42	17	8.26	22	8.00	27	7.95
3		8	8.45	13	8.80	18	8.20	23	8.00	28	7.95
4		9	9.35	14	8.50	19	8.12	24	8.00	29	7.92
5		10	9.02	15	8.35	20	8.12	25	8.00	30	7.94
										31	7.97

EEL RIVER NEAR SCOTIA, CAL.

This station, which is located in sec. 18, T. 1 N., R. 1 E., at Wildwood Ferry, half a mile below Scotia, was established December 15, 1910.

Van Duzen River enters the Eel about 7 miles below and Laribee Creek about 14 miles above the station.

The staff gage is in four sections on the left bank of the river. The first three sections are 70 feet above the ferry; the upper section is at the mouth of Dean Creek, about 150 feet farther upstream.

Discharge measurements are made from the ferry or a small boat.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of Eel River near Scotia, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 17[a]	W. V. Hardy	55	54	(b)	91
Dec. 15[c]	do	480	1,270	11.59	2,110

[a] Made by wading one-half mile below ferry.
[b] No gage installed.
[c] Made from boat about 100 feet above ferry cable.

Daily gage height of Eel River near Scotia, Cal., for 1910.

[Fred Daggett, observer.]

	Feet.		Feet.
Dec. 18	11.59	Dec. 25	11.05
19	11.47	26	11.0
20	11.35	27	10.95
21	11.3	28	10.9
22	11.2	29	10.85
23	11.15	30	10.8
24	11.1	31	10.8

MAD RIVER BASIN.

MAD RIVER NEAR ARCATA, CAL.

Mad River rises in the southern part of Trinity County and flows northwestward across Humboldt County to the Pacific Ocean. The total length of the stream is about 90 miles.

The basin is very narrow and tributaries are unimportant. The upper and lower parts contain good agricultural land; the middle part is suitable only for grazing.

During the rainy season the river is turbulent. In the upper part of its course its channel is practically dry during the summer months, the water standing in pools; farther down flow continues throughout the year, but is insufficient to irrigate all the land that is improved.

The lower course of the river is through the famous redwood (*Sequoia sempervirens*) belt. The remainder of the basin has only a fair forest cover consisting of grass and scrubby timber without much brush.

The gaging station, which is located in sec. 14, T. 6 N., R. 1 E., at the Oregon & Eureka Railroad bridge, 5 miles northeast of Arcata and 1 mile below Warren Creek, was established December 28, 1910.

The gage is a vertical staff in two sections on the right bank at the railroad bridge.

Discharge measurements are made from a highway bridge just above the railroad bridge.

Discharge measurements of Mad River near Arcata, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 20[a]	W. V. Hardy	30	18	(b)	32
Dec. 29[c]	do	100	186	12.70	241

[a] Made by wading just below Warren Creek.
[b] No gage installed.
[c] Made by wading about 200 feet below bridge.

Gage height of Mad River near Arcata, Cal., for 1910.

[Ernest McCloskey, observer.]

	Feet.
Dec. 28	12.7
Dec. 29	12.7
Dec. 30	12.7
Dec. 31	13.0

KLAMATH RIVER BASIN.

GENERAL FEATURES.

Klamath River drains a territory lying east of the Cascade Range in south-central Oregon and south of the Siskiyou Mountains in California. The river rises in upper Klamath Lake, flows generally southward, and reaches the Pacific Ocean at Requa, on the coast of northern California. Only that part of the basin lying in Oregon has been studied in detail. The drainage from this portion of the area is collected in large lakes whose margins are wide shallow marsh lands covered with tules and aquatic plants. From upper Klamath Lake, which stands 4,141 feet above sea level, flows Link River, a stream 1¼ miles long, discharging into Lake Ewauna at an elevation of 4,080 feet. Klamath Falls, the principal city of this section, is located on Link River. From Lake Ewauna to the town of Keno, Klamath River flows through a flat marshy country a distance of 20 miles. About 5 miles above Keno the river is connected with lower Klamath Lake by a channel known as Klamath Straits. During high stages water flows from Klamath River into lower Klamath Lake, and during low water the direction of the flow is reversed. About half a mile below Keno the river breaks over a rocky ledge, and here begins its precipitous fall of 100 to 200 feet per mile to its mouth. The drainage area above Keno, exclusive of lower Klamath Lake, is 3,150 square miles. The streams draining into upper Klamath Lake head about 6,000 feet above sea level. The elevation of Klamath Falls is 4,100 feet.

The principal tributaries of Klamath River are Sprague River, which drains the southwestern rim of the Great Basin divide in Oregon; Anna River, which heads in a large spring supposed to be fed by the waters of Crater Lake; Scott River, which drains a rich agricultural valley extending from Fort Jones to French Gulch; and Trinity River, which drains a portion of the western slope of Trinity Mountain. Williamson River, which drains the northern part of the Klamath Indian Reservation, is tributary to Sprague River. Lost River, although not a tributary of the Klamath, is usually considered with it, as a slough connects the two. Water formerly flowed in either direction, depending on which stream was higher, but the flow is now stopped by an artificial dike.

The chief tributary of Trinity River is the South Fork, which joins the main river a few miles below Hawkins Bar.

UPPER KLAMATH LAKE NEAR KLAMATH FALLS, OREG.

Upper Klamath Lake is to be used by the United States Reclamation Service as a source of water supply to irrigate large areas of land. The main canal of the Klamath project has its intake at the lake.

A gage was installed on this lake near Klamath Falls, Oreg., May 28, 1904. The elevation of the zero of the gage is 4,136.13 feet above sea level. The daily records since February 16, 1906, are the mean daily heights obtained from a Friez automatic water gage.

The winds have a marked effect on the level of the water surface of this lake. The water is lowered as much as 6 inches near the outlet when the wind blows from the south, and is raised as much over its normal level when the wind is in the opposite direction. Differences of a foot are frequently noticeable within a few hours. If the wind effect were eliminated the lake heights would show much more gradual changes than indicated by the accompanying records.

Data for this station are furnished by the United States Reclamation Service.

Daily gage height, in feet, of Upper Klamath Lake near Klamath Falls, Oreg., for 1910.

[A. J. Santaman, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	6.00	.....	5.75	6.70	6.10	5.90	4.90	4.50	.....	4.60	.....	5.58
2	6.00	.....	5.90	6.80	6.08	5.60	.....	4.43	.....	4.20	.....	5.55
3	6.00	5.40	6.00	6.62	6.10	5.55	.....	4.48	4.30	4.76	.....	5.50
4	6.00	5.40	5.90	6.58	6.05	5.30	.....	4.35	4.30	.....	.....	5.49
5	6.00	5.40	5.95	6.60	6.05	5.35	.....	4.33	4.32	.....	4.78	5.49
6	6.00	5.40	6.00	6.51	6.00	5.35	.....	4.59	4.35	4.49	4.75	5.49
7	6.00	5.40	6.10	6.45	5.92	5.30	.....	4.56	4.30	4.47	4.95	5.52
8	6.00	5.41	6.17	6.45	5.85	5.18	.....	4.51	4.30	4.45	5.09	5.55
9	6.00	5.43	6.23	6.30	5.66	5.10	4.80	4.51	4.31	4.42	.....	5.68
10	5.90	5.45	6.30	6.10	5.90	5.10	4.80	4.51	.....	4.50	.....	5.74
11	5.90	5.50	6.35	6.52	5.90	5.35	4.80	4.54	.....	4.63	.....	5.77
12	5.80	5.50	6.43	6.60	5.80	5.35	4.75	4.59	.....	4.65	5.00	5.79
13	5.60	5.41	6.46	6.55	5.65	5.40	4.70	4.50	.....	4.70	4.95	5.80
14	5.50	5.42	6.45	6.40	5.60	5.25	4.50	4.53	.....	4.75	5.00	5.80
15	5.50	5.43	6.46	6.37	5.44	5.30	4.55	4.50	.....	4.61	4.95	5.89
16	5.50	5.43	6.51	6.35	5.40	5.15	4.62	.....	.....	4.70	4.94	6.14
17	5.50	5.43	6.20	6.30	5.42	5.10	4.75	.....	4.52	4.72	5.05	6.25
18	5.50	5.43	6.30	6.10	5.50	4.60	4.62	.....	4.50	4.71	5.20	6.30
19	5.50	5.40	5.90	6.35	5.50	4.80	4.50	.....	4.60	4.65	4.96	6.30
20	5.50	5.40	6.00	6.30	5.40	4.80	4.56	4.31	4.28	4.63	4.99	6.30
21	5.50	5.38	6.00	6.25	5.25	4.80	4.70	4.30	4.32	4.65	5.18	6.30
22	5.50	5.39	6.13	6.20	5.20	4.76	4.60	4.31	4.30	4.60	5.22	6.30
23	.....	5.38	6.13	6.45	5.10	4.70	4.55	4.50	4.32	4.68	5.40	6.30
24	.....	5.45	6.23	6.30	5.20	4.70	4.55	4.30	4.65	4.68	5.45	6.14
25	.....	5.45	6.33	6.40	5.10	4.94	4.55	4.30	4.58	4.67	5.45	5.70
26	.....	5.50	6.70	6.40	5.20	4.98	4.55	4.30	4.58	4.82	5.43	5.73
27	.....	5.60	7.00	6.40	5.20	5.02	4.50	.....	4.59	4.82	5.47	5.71
28	.....	5.65	6.95	6.40	5.65	4.92	4.45	.....	4.62	4.78	5.57	5.69
29	.....	.....	6.85	6.35	5.75	5.05	4.50	.....	4.59	.....	5.56	5.66
30	.....	.....	6.90	6.20	5.70	4.98	4.48	.....	4.60	.....	5.60	5.87
31	.....	.....	6.90	.....	5.75	.....	4.59	.....	.....	.....	.....	5.80

NOTE.—Gage heights obtained by means of a Friez self-recording gage. Gage heights Dec. 1 to 5, interpolated. Lake probably frozen during January and the first part of February and after about Dec. 13.

LINK RIVER AT KLAMATH FALLS, OREG.

This station, which is located in sec. 32, T. 38 S., R. 9 E., at the county bridge over Link River at Klamath Falls, 1¼ miles below the outlet of Upper Klamath Lake and immediately at the head of Lake Ewauna, was established May 15, 1904. The river has a fall of 70 feet in the 1¼ miles between the lakes, a portion of which is utilized for water power.

The records prior to June 6, 1908, especially the individual daily records, are not reliable. It is probable that for longer periods—a month or more—the total flow as determined is not greatly in error. This condition is accounted for by the effect of wind on the flow of water at this station. The original gage was located at the bridge at the upper end of Lake Ewauna. At the outlet of Upper Klamath Lake the river breaks over a rather shallow ledge. A strong wind upstream blows the water back from this outlet and at the same time increases the height of water on the gage by backing the water in Lake Ewauna. So great is this wind effect that the river has been known to go entirely dry for a few hours at a time. When the wind is downstream the flow of Link River is greatly increased; but owing to the large surface of Lake Ewauna this increase in flow is not shown by the gage heights. In the long run these wind effects are no doubt compensatory, but little dependence can be placed in the published daily records prior to March 7, 1908. On this date an anemometer was installed on the bridge and a ship's taffrail log was trailed in the water under the bridge. It was hoped that the daily reading from this log would afford some indication of the velocities with the anemometer records. Although the records obtained by this device were much more reliable during 1907 than previously, even they were not all that could be desired. It became evident that owing to the sudden changes of the wind complete data could not be obtained without automatic recording devices on both the log and anemometer. The method was effective, however, in reducing the probable error of the estimates from about 15 per cent to within less than 5 per cent. On June 6, 1908, a Friez gage was installed in the rapids, where it could be affected only by change in flow, measurements being made at the bridge as formerly.

For the remainder of 1908 and for 1909 the records obtained are reliable. During 1910 water was diverted around the Friez gage in the rapids, for use by the power plant operated by Moore Bros. This water was returned to the river between the Friez gage and the gage at the bridge. No daily record was kept of the amount of water thus diverted around the Friez gage, although several measurements of the amount of water in Moore Bros.' flume were made. Only one measurement was referred to the Friez gage during the

year. The Friez gage readings were also somewhat affected by backwater from log jams. The daily discharge for 1910 must therefore be determined from the gage at the bridge, subject to all the uncertainties noted above.

This station was maintained during 1910 by the United States Reclamation Service, but the daily and monthly discharge tables were computed by the United States Geological Survey.

Discharge measurements of Link River at Klamath Falls, Oreg., in 1910.

Date.	Hydrographer.	Gage height.	Discharge.
		Feet.	*Sec. ft.*
Mar. 17	John Yadon	[a] 5.08	4,520
July 29	....do	2.90	1,180
Aug. 25	Leland Moser	[b] 2.57	1,160
Dec. 12	....do	3.90	3,320
18	....do	4.12	3,640
28	....do	4.15	3,240

[a] Friez gage read 3.20 feet.
[b] Friez gage read 0.91 foot.

NOTE.—Gage heights refer to the gage at the bridge.

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1910.

[Friez gage.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2.42	2.27	2.36	3.30	2.80	2.75	1.90	1.15	0.90	1.02	.....	1.71
2	2.40	2.24	2.48	3.55	2.78	2.48	1.90	1.10	.91	1.20	.....	1.70
3	2.37	2.24	2.55	3.35	2.80	2.51	2.20	1.00	1.00	1.00	.....	2.05
4	2.34	2.24	2.65	3.32	2.71	2.55	2.15	1.10	.92	1.09	.....	2.09
5	2.31	2.04	2.75	3.35	2.72	2.46	2.15	.98	.89	1.10	1.00	2.11
6	2.28	2.04	2.84	3.25	2.68	2.50	2.20	1.08	.98	1.11	.96	2.09
7	2.28	2.04	2.89	3.22	2.48	2.45	2.35	1.02	1.00	1.09	1.10	2.11
8	2.37	2.03	2.97	3.22	2.40	2.41	2.32	1.02	.88	1.10	1.00	2.15
9	2.36	2.03	3.01	2.78	2.15	2.41	2.35	.95	.88	1.08	.98	2.24
10	2.35	2.02	3.05	3.05	2.17	2.60	2.35	.95	.95	.98	1.30	2.26
11	2.31	2.02	3.08	3.22	2.25	2.70	2.52	.93	1.08	1.05	1.49	2.28
12	2.20	2.07	3.14	3.22	2.28	2.56	2.50	1.02	.99	1.21	1.46	2.30
13	2.18	2.08	3.15	3.15	2.26	2.60	2.42	1.08	.80	1.28	1.45	2.32
14	2.18	2.10	3.15	3.10	2.29	2.20	2.05	1.03	.89	1.35	1.39	2.34
15	2.18	2.09	3.17	3.08	2.25	2.05	2.20	1.06	.87	1.28	1.34	2.40
16	2.15	2.06	3.19	3.10	2.20	1.76	2.40	1.08	.85	1.28	1.33	2.58
17	2.12	2.05	3.18	3.06	2.40	1.65	2.70	.98	.98	1.35	1.38	2.61
18	2.12	2.08	2.95	2.90	2.70	1.50	2.45	.85	1.22	1.35	1.37	2.48
19	2.11	2.10	3.18	3.10	2.65	1.46	2.20	.80	1.19	1.28	1.35	2.45
20	2.08	2.10	3.24	3.08	2.53	1.65	1.60	.75	.89	1.28	1.39	2.45
21	2.09	2.07	3.28	3.04	2.53	1.80	1.25	.88	.88	1.29	1.45	2.40
22	2.14	2.06	3.42	2.98	2.53	1.85	1.22	.88	.92	1.22	1.50	2.39
23	2.14	2.06	3.40	2.92	2.35	1.95	1.20	.94	.98	1.19	1.73	2.34
24	2.13	2.15	3.45	2.80	2.58	1.90	1.20	1.20	1.02	1.14	1.72	2.38
25	2.17	2.15	3.25	2.85	2.45	2.00	1.20	.91	1.10	1.21	1.68	2.35
26	2.18	2.13	3.20	2.90	2.38	2.20	1.20	.82	1.02	1.28	1.45	2.32
27	2.19	2.20	3.50	2.95	2.47	2.24	1.20	.90	1.00	1.12	1.60	2.31
28	2.21	2.30	3.45	2.86	2.22	2.50	1.10	.91	1.00	1.10	1.71	2.29
29	2.25	.....	3.40	2.89	2.45	2.40	1.06	1.10	1.02	1.10	1.79	2.28
30	2.26	.....	3.41	2.88	2.45	2.10	1.10	.88	1.00	1.08	1.80	2.30
31	2.33	.....	3.40	.....	2.65	.....	1.10	.90	.....	1.09	.....	2.32

NOTE.—Gage heights affected by back water from log jam below the gage May 19, to July 21. Records for Nov. 1 to 4 are uncertain and have been discarded.

Daily gage height, in feet, of Link River at Klamath Falls, Oreg., for 1910.

[Gage at bridge. Vincent Yaden, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.3	4.2	4.45	5.4	5.05	4.15	3.35	2.75	2.55	2.6	3.05	3.65
2	4.25	4.3	4.45	5.7	5.05	4.1	3.35	2.75	2.55	2.7	3.15	3.68
3	4.25	4.3	4.5	5.4	5.1	4.1	3.5	2.8	2.6	2.7	2.95	3.7
4	4.25	4.25	4.55	5.4	5.1	4.15	3.35	2.8	2.6	2.65	2.95	3.65
5	4.25	4.2	4.6	5.4	5.05	4.1	3.3	2.75	2.6	2.75	2.95	3.7
6	4.25	4.2	4.65	5.35	5.05	4.1	3.3	2.7	2.55	2.75	2.9	3.75
7	4.25	4.2	4.7	5.35	5.0	4.0	3.25	2.75	2.55	2.75	3.0	3.75
8	4.25	4.2	4.75	5.4	4.95	4.0	3.2	2.75	2.6	2.75	3.15	3.8
9	4.25	4.25	4.75	5.4	4.95	4.0	3.2	2.75	2.6	2.85	3.1	3.85
10	4.25	4.2	4.85	5.4	4.9	4.0	3.2	2.75	2.55	2.85	3.25	3.85
11	4.25	4.2	4.9	5.4	4.75	4.0	3.2	2.7	2.6	2.9	3.0	3.85
12	4.4	4.2	4.9	5.35	4.75	4.0	3.2	2.65	2.6	3.0	3.0	3.85
13	4.4	4.25	4.95	5.35	4.55	4.0	3.2	2.65	2.6	2.9	3.05	3.95
14	4.3	4.2	5.0	5.3	4.45	3.95	3.15	2.65	2.55	2.85	3.05	4.0
15	4.25	4.2	5.0	5.3	4.45	3.85	3.15	2.6	2.55	2.85	3.1	4.0
16	4.2	4.2	5.05	5.3	4.55	3.75	3.05	2.6	2.6	2.85	3.05	4.0
17	4.2	4.25	5.05	5.35	4.5	3.8	3.0	2.65	2.55	2.9	3.1	4.2
18	4.15	4.2	5.2	5.4	4.55	3.8	3.0	2.65	2.55	2.9	3.15	4.1
19	4.2	4.2	5.15	5.35	4.5	3.8	3.0	2.6	2.7	3.0	3.1	4.1
20	4.2	4.25	5.15	5.3	4.5	3.6	3.0	2.6	2.65	2.95	3.1	4.1
21	4.15	4.3	5.2	5.25	4.45	3.55	3.05	2.6	2.6	2.95	3.25	4.15
22	4.2	4.25	5.2	5.25	4.45	3.55	2.95	2.6	2.6	3.0	3.15	4.15
23	4.2	4.25	5.3	5.25	4.45	3.5	2.95	2.55	2.6	2.95	3.4	4.15
24	4.25	4.3	5.3	5.2	4.45	3.5	2.95	2.55	2.6	2.95	3.45	4.1
25	4.3	4.35	5.35	5.3	4.35	3.5	2.95	2.55	2.6	3.0	3.4	4.15
26	4.25	4.3	5.4	5.15	4.35	3.5	2.9	2.6	2.6	3.0	3.45	4.05
27	4.2	4.3	5.4	5.25	4.25	3.45	2.9	2.55	2.6	3.0	3.55	4.0
28	4.2	4.45	5.35	5.15	4.2	3.5	2.9	2.6	2.65	3.0	3.5	4.15
29	4.2	.....	5.4	5.05	4.15	3.45	2.9	2.6	2.6	3.0	3.55	4.1
30	4.25	.....	5.4	5.1	4.1	3.45	2.9	2.6	2.6	3.0	3.55	4.15
31	4.2	.....	5.4	.....	4.2	.....	2.85	2.6	.....	.....	.....	4.15

Daily discharge, in second-feet, of Link River at Klamath Falls, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,900	2,740	3,140	4,930	4,240	2,660	1,640	1,120	1,010	1,040	1,340	1,980
2	2,820	2,900	3,140	5,570	4,240	2,590	1,640	1,120	1,010	1,090	1,440	1,980
3	2,820	2,900	3,230	4,930	4,340	2,590	1,800	1,150	1,040	1,090	1,260	2,040
4	2,820	2,820	3,320	4,930	4,340	2,660	1,640	1,150	1,040	1,060	1,260	1,980
5	2,820	2,740	3,400	4,930	4,240	2,590	1,580	1,120	1,040	1,120	1,260	2,040
6	2,820	2,740	3,490	4,830	4,240	2,590	1,580	1,090	1,010	1,120	1,220	2,110
7	2,820	2,740	3,580	4,830	4,150	2,450	1,540	1,120	1,010	1,120	1,300	2,110
8	2,820	2,740	3,680	4,930	4,060	2,450	1,480	1,120	1,040	1,120	1,440	2,180
9	2,820	2,820	3,680	4,930	4,060	2,450	1,480	1,120	1,040	1,180	1,390	2,380
10	2,820	2,740	3,860	4,930	3,960	2,450	1,480	1,120	1,010	1,180	1,540	2,380
11	2,820	2,740	3,960	4,930	3,680	2,450	1,480	1,090	1,040	1,220	1,300	2,380
12	3,060	2,740	3,960	4,830	3,680	2,450	1,480	1,060	1,040	1,300	1,300	2,380
13	3,060	2,820	4,060	4,830	3,320	2,450	1,480	1,060	1,040	1,220	1,340	2,380
14	2,900	2,740	4,150	4,730	3,140	2,380	1,440	1,060	1,010	1,180	1,340	2,450
15	2,820	2,740	4,150	4,730	3,140	2,240	1,440	1,040	1,010	1,180	1,390	2,450
16	2,740	2,740	4,240	4,730	3,320	2,110	1,340	1,040	1,040	1,180	1,340	2,450
17	2,740	2,820	4,240	4,830	3,230	2,180	1,300	1,060	1,010	1,220	1,390	2,740
18	2,660	2,740	4,530	4,930	3,320	2,180	1,300	1,060	1,010	1,220	1,440	2,590
19	2,740	2,740	4,440	4,830	3,230	2,180	1,300	1,040	1,090	1,300	1,390	2,590
20	2,740	2,820	4,440	4,730	3,230	1,920	1,300	1,040	1,060	1,260	1,390	2,590
21	2,660	2,900	4,530	4,630	3,140	1,860	1,340	1,040	1,040	1,260	1,540	2,660
22	2,740	2,820	4,530	4,630	3,140	1,860	1,260	1,040	1,040	1,300	1,440	2,660
23	2,740	2,820	4,730	4,630	3,140	1,800	1,260	1,010	1,040	1,260	1,690	2,660
24	2,820	2,900	4,730	4,530	3,140	1,800	1,260	1,010	1,040	1,260	1,740	2,590
25	2,900	2,980	4,830	4,730	2,980	1,800	1,260	1,010	1,040	1,300	1,690	2,660
26	2,820	2,900	4,930	4,440	2,980	1,800	1,220	1,040	1,040	1,300	1,740	2,520
27	2,740	2,900	4,930	4,630	2,820	1,740	1,220	1,010	1,040	1,300	1,860	2,450
28	2,740	3,140	4,830	4,440	2,740	1,800	1,220	1,040	1,060	1,300	1,800	2,660
29	2,740	.....	4,930	4,240	2,660	1,740	1,220	1,040	1,040	1,300	1,860	2,590
30	2,820	.....	4,930	4,340	2,590	1,740	1,220	1,040	1,040	1,300	1,860	2,660
31	2,740	.....	4,930	.....	2,740	.....	1,180	1,040	.....	1,320	.....	2,660

NOTE.—Daily discharges determined from the gage heights at the bridge and a rating table that is poorly defined on account of the effect of wind. The estimate for any one day may be 25 per cent or more in error.

Monthly discharge of Link River at Klamath Falls, Oreg., for 1910.

[Drainage area, 3,110 square miles.]

Month.	Discharge in second-feet.				Run-off.		
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	Accuracy.
January	3,060	2,660	2,810	0.904	1.04	173,000	C.
February	3,140	2,740	2,820	.907	.94	157,000	C.
March	4,930	3,140	4,180	1.34	1.54	257,000	C.
April	5,570	4,240	4,770	1.53	1.71	284,000	C.
May	4,340	2,590	3,460	1.11	1.28	213,000	C.
June	2,660	1,740	2,200	.707	.79	131,000	C.
July	1,800	1,180	1,400	.450	.52	86,100	C.
August	1,150	1,010	1,070	.344	.40	65,800	C.
September	1,090	1,010	1,030	.331	.37	61,300	C.
October	1,320	1,040	1,210	.389	.45	74,400	C.
November	1,860	1,220	1,480	.476	.53	88,100	C.
December	2,740	1,980	2,420	.778	.90	149,000	C.
The year	5,570	1,010	2,400	.772	10.47	1,740,000	

NOTE.—Determinations of monthly discharge are provisional and subject to revision when more measurements referred to the Friez gage are available.

KLAMATH RIVER AT KENO, OREG.

This station, which is located at the county bridge at Keno, in sec. 31, T. 39 S., R. 8 E., at the lower end of the lakes and marshes that form the headwaters of Klamath River, was established May 31, 1904. The United States Reclamation Service is reclaiming lands for irrigation in two ways—by diverting waters from Klamath Lake and by draining the large swamp areas bordering this stream and the lakes which are tributary to it. Immediately below the station the river breaks over a rocky ledge with a fall of about 200 feet to the mile.

During the winter the river usually freezes over, but as the water is comparatively deep and the ice is not very thick the accuracy of records has not been greatly affected by the ice. At low stages a growth of aquatic plants clogs the section and to some extent lessens the accuracy of the results. An additional source of error has resulted from the effect of wind on the wide expanse of water above the station. A strong upstream wind will blow the water back from the outlet and diminish the flow, but as the gage is located at the bridge, 1,000 feet above the gaging site, gage heights are not always affected to a corresponding degree. The datum of the gage has not been changed since it was installed.

Discharge measurements are made from a cable 1,000 feet below the gage.

This station was not visited in 1910, but conditions seem to be fairly permanent, and the 1909 discharge rating curve is believed to give reasonably close results. The station was maintained during 1910 by the United States Reclamation Service, but the daily and monthly discharge tables were computed by the United States Geological Survey.

Daily gage height, in feet, of Klamath River at Keno, Oreg., for 1910.

[H. Snowgoose, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	13.2	13.25	13.5	13.9	13.8	13.05	12.4	11.95	11.75	11.65	12.15	12.55
2	13.2	13.25	13.5	13.9	13.8	13.1	12.35	11.95	11.7	11.85	12.1	12.6
3	13.2	13.25	13.5	13.9	13.8	13.1	12.4	11.85	11.6	11.75	12.1	12.6
4	13.2	13.25	13.55	13.9	13.8	13.1	12.4	11.95	11.75	11.9	12.1	12.65
5	13.25	13.3	13.55	13.9	13.8	13.0	12.4	11.9	11.75	11.9	12.1	12.65
6	13.25	13.3	13.55	13.95	13.75	13.0	12.4	11.9	11.7	11.9	12.1	12.7
7	13.25	13.3	13.6	13.95	13.75	13.0	12.4	11.9	11.75	11.9	12.1	12.7
8	13.3	13.3	13.6	13.95	13.75	13.0	12.35	11.9	11.7	11.9	12.15	12.7
9	13.3	13.3	13.65	13.95	13.7	12.95	12.35	11.85	11.65	12.0	12.15	12.75
10	13.3	13.3	13.65	13.9	13.7	12.95	12.35	11.85	11.65	11.9	12.25	12.8
11	13.3	13.3	13.65	13.95	13.65	12.9	12.35	11.85	11.75	12.0	12.1	12.8
12	13.3	13.3	13.65	13.9	13.6	12.9	12.3	11.8	11.75	12.1	12.1	12.8
13	13.3	13.3	13.65	13.95	13.55	12.9	12.3	11.8	11.7	12.0	12.15	12.85
14	13.2	13.3	13.7	13.9	13.55	12.85	12.25	11.8	11.7	12.0	12.15	12.85
15	13.2	13.3	13.7	13.95	13.5	12.85	12.25	11.8	11.75	12.0	12.15	12.85
16	13.2	13.3	13.7	13.95	13.45	12.8	12.25	11.8	11.65	12.0	12.15	12.85
17	13.2	13.3	13.75	13.95	13.4	12.75	12.15	11.85	11.65	12.05	12.15	12.95
18	13.2	13.3	13.8	13.95	13.4	12.75	12.15	11.85	11.75	12.05	12.2	12.95
19	13.2	13.3	13.8	13.95	13.35	12.75	12.15	11.8	11.85	12.1	12.2	12.95
20	13.2	13.3	13.8	13.95	13.35	12.65	12.15	11.7	11.8	12.05	12.2	12.95
21	13.2	13.3	13.8	13.95	13.35	12.65	12.05	11.75	11.8	12.05	12.3	12.95
22	13.2	13.35	13.85	13.95	13.35	12.6	12.15	11.75	11.85	12.05	12.25	12.95
23	13.2	13.35	13.85	13.95	13.35	12.6	12.1	11.75	11.85	12.05	12.4	12.95
24	13.2	13.35	13.9	13.9	13.3	12.6	12.1	11.75	11.85	12.1	12.45	12.95
25	13.2	13.4	13.9	13.9	13.25	12.6	12.1	11.75	11.85	12.1	12.45	12.95
26	13.2	13.4	13.9	13.85	13.2	12.55	12.05	11.7	11.85	12.1	12.45	12.95
27	13.2	13.4	13.9	13.85	13.15	12.4	12.05	11.75	11.85	12.1	12.5	12.95
28	13.2	13.4	13.9	13.8	13.15	12.5	12.05	11.65	11.85	12.1	12.5	12.95
29	13.2	.....	13.9	13.8	13.1	12.5	12.0	11.7	11.85	12.1	12.5	12.95
30	13.2	.....	.....	13.8	13.15	12.45	12.0	11.75	11.85	12.1	12.5	12.95
31	13.25	.....	.....	.....	13.15	.....	12.0	11.65	.....	12.1	.....	12.95

NOTE.—Relation between gage heights and discharge at this station little affected by ice.

Daily discharge, in second-feet, of Klamath River at Keno, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2,690	2,780	3,250	4,080	3,870	2,440	1,510	1,020	870	810	1,220	1,700
2	2,690	2,780	3,250	4,080	3,870	2,520	1,450	1,020	840	935	1,160	1,760
3	2,690	2,780	3,250	4,080	3,870	2,520	1,510	935	780	870	1,160	1,760
4	2,690	2,780	3,350	4,080	3,870	2,520	1,510	1,020	870	970	1,160	1,830
5	2,780	3,870	3,350	4,080	3,870	2,360	1,510	970	870	970	1,160	1,830
6	2,780	2,870	3,350	4,190	3,760	2,360	1,510	970	840	970	1,160	1,900
7	2,780	2,870	3,450	4,190	3,760	2,360	1,510	970	870	970	1,160	1,900
8	2,870	2,870	3,450	4,190	3,760	2,360	1,450	970	840	970	1,220	1,900
9	2,870	2,870	3,560	4,190	3,660	2,280	1,450	935	810	1,060	1,220	1,980
10	2,870	2,870	3,560	4,080	3,660	2,280	1,450	935	810	970	1,330	2,050
11	2,870	2,870	3,560	4,190	3,560	2,200	1,450	935	870	1,060	1,160	2,050
12	2,870	2,870	3,560	4,080	3,450	2,200	1,390	900	870	1,160	1,160	2,050
13	2,870	2,870	3,560	4,190	3,350	2,200	1,390	900	840	1,060	1,220	2,120
14	2,690	2,870	3,660	4,080	3,350	2,120	1,330	900	840	1,060	1,220	2,120
15	2,690	2,870	3,660	4,190	3,250	2,120	1,330	900	870	1,060	1,220	2,120
16	2,690	2,870	3,660	4,190	3,160	2,050	1,330	900	810	1,060	1,220	2,120
17	2,690	2,870	3,760	4,190	3,060	1,980	1,220	935	810	1,110	1,220	2,280
18	2,690	2,870	3,870	4,190	3,060	1,980	1,220	935	870	1,110	1,270	2,280
19	2,690	2,870	3,870	4,190	2,960	1,980	1,220	900	935	1,160	1,270	2,280
20	2,690	2,870	3,870	4,190	2,960	1,830	1,220	840	900	1,110	1,270	2,280
21	2,690	2,870	3,870	4,190	2,960	1,830	1,110	870	900	1,110	1,390	2,280
22	2,690	2,960	3,980	4,190	2,960	1,760	1,220	870	935	1,110	1,330	2,280
23	2,690	2,960	3,980	4,190	2,960	1,760	1,160	870	935	1,110	1,510	2,280
24	2,690	2,960	4,080	4,080	2,870	1,760	1,160	870	935	1,160	1,570	2,280
25	2,690	3,060	4,080	4,080	2,780	1,760	1,160	870	935	1,160	1,570	2,280
26	2,690	3,060	4,080	3,980	2,600	1,700	1,110	840	935	1,160	1,570	2,280
27	2,690	3,060	4,080	3,980	2,600	1,510	1,110	870	935	1,160	1,630	2,280
28	2,690	3,060	4,080	3,870	2,600	1,630	1,110	810	935	1,160	1,630	2,280
29	2,690	.....	4,080	3,870	2,520	1,630	1,060	840	935	1,160	1,630	2,280
30	2,690	.....	4,080	3,870	2,600	1,570	1,060	870	935	1,160	1,630	2,280
31	2,780	.....	4,080	.....	2,600	.....	1,060	810	.....	1,160	.....	2,280

NOTE.—Daily discharge determined from a rating curve fairly well defined for 1909 but somewhat uncertain for 1910 on account of the lack of measurements.

Monthly discharge of Klamath River at Keno, Oreg., for 1910.

[Drainage area, 3,150 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	2,870	2,690	2,740	0.870	1.00	168,000	B.
February	3,060	2,780	2,890	.917	.95	160,000	B.
March	4,080	3,250	3,720	1.18	1.36	229,000	B.
April	4,190	3,870	4,110	1.30	1.45	245,000	B.
May	3,870	2,520	3,230	1.03	1.19	199,000	B.
June	2,520	1,510	2,050	.651	.73	122,000	B.
July	1,510	1,060	1,300	.413	.48	79,900	B.
August	1,020	810	909	.289	.33	55,900	B.
September	935	780	878	.279	.31	52,200	B.
October	1,160	810	1,070	.340	.39	65,800	B.
November	1,630	1,160	1,320	.419	.47	78,600	B.
December	2,280	1,700	2,110	.670	.77	130,000	B.
The year	4,190	780	2,190	.695	9.43	1,590,000	

KLAMATH RIVER NEAR REQUA, CAL.

This station, which is located at Nye's ranch in sec. 29, T. 13 N., R. 2 E., 9 miles above Requa, was established December 25, 1910. It is 30 miles below the mouth of Trinity River and 10 miles above the mouth of Klamath River.

The staff gage is in four sections on the right bank near the ferry. Discharge measurements are made from the ferry or a small boat.

Discharge measurements of Klamath River near Requa, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. feet.*	*Feet.*	*Sec.-ft.*
Aug. 31 [a]	W. V. Hardy	350	1,880	(b)	2,430
Dec. 25 [c]	do	570	3,620	8.78	10,300

[a] Made from canoe 500 feet above cable at Nye's ranch.
[b] No gage installed. Approximate gage height 5.78 feet, determined Dec. 25.
[c] Made from canoe at gage.

Daily gage height of Klamath River near Requa, Cal., for 1910.

[M. F. Scofield, observer.]

	Feet.		Feet.
December 25	8.78	December 29	8.40
December 26	8.63	December 30	8.43
December 27	8.56	December 31	8.37
December 28	8.45		

WILLIAMSON RIVER NEAR KLAMATH AGENCY, OREG.

This station, which is located 13 miles northeast of the Klamath Agency, in the NW. ¼ sec. 1, T. 33 S., R. 7 E., at a point locally known as Rocky Ford, at the lower extremity of Klamath Marsh, was established March 26, 1908, in cooperation with the United States Office of Indian Affairs, and discontinued June 26, 1910, as the observer moved away and no other was obtainable.

The nearest tributary is Spring Creek, 11 miles below the station. Owing to the inaccessibility of the station, it has not been practicable to obtain continuous records of discharge. During the winter months it is almost impossible to reach the station on account of snow.

Discharge measurements are made from a cable and car.

The staff gage was originally located about 1,000 feet above the cable. On October 17, 1908, a Bristol self-registering gage was installed, and as this required only weekly visits by the observer, continuous records were obtained during the remainder of the year. The gage was moved May 30, 1909, to a point 100 feet downstream at the location of the cable. It was set to read the same as at the former location, but on account of the slope of the river there is no constant relation. The datum of the gage as reset is at an elevation of 4,622.19 feet above sea level. On November 10, 1909, an auxiliary staff gage was installed below the mouth of Spring Creek to be used when the regular station is inaccessible. Simultaneous readings were made on both gages from November, 1909, to June, 1910. The upper gage was washed out during the high water of March, 1910, and was replaced April 15, with a Bristol self-recording gage.

In the meantime weekly readings were continued on the lower gage. The relation between the two gages has been determined and the gage heights for the missing period have been estimated.

Owing to the large storage capacity in Klamath Marsh the river is not subject to great fluctuations. It is probable that weekly observations will give sufficient data for an estimate of the flow.

The accuracy of the results is somewhat affected by the growth of aquatic plants in the river channel during the season, and a comparatively large number of measurements will be necessary in order to secure reliable results. The data herewith were obtained by usual methods, using a mean curve. The following measurement was made by Leland Moser[1] August 11, 1910: Width, 80 feet; area of section, 150 square feet; gage height, 0.54 feet; discharge, 55.2 second-feet.

[1] The results of this measurement are very uncertain, as the velocity was very low and the whole river bed was covered with grass and tules.

Daily gage height, in feet, of Williamson River near Klamath Agency, Oreg., for 1910.

[Gage at Rockyford. R. C. Spink, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1					1.7	
2	1.8			2.6	1.7	
3					1.65	
4					1.65	
5					1.65	
6		1.45	2.7		1.65	1.0
7					1.65	1.0
8					1.65	1.0
9	1.6				1.6	1.0
10				2.5	1.6	1.0
11					1.55	1.0
12					1.55	1.0
13		1.25	3.7		1.5	1.0
14					1.5	.95
15				2.1	1.5	.95
16	1.2			2.1	1.5	.95
17				2.1	1.3	.95
18				2.1	1.2	.9
19				2.1	1.0	.9
20		1.25	3.4	1.9	1.05	
21				1.85	1.35	
22				1.9	1.2	
23	1.15			1.85	1.2	
24				1.85	1.1	
25				1.75	1.1	
26				1.8	1.1	.9
27		1.6	3.1	1.75	1.0	
28				1.7	1.0	
29				1.7	1.1	
30	1.45			1.7		
31						

NOTE.—Gage heights Apr. 15 to June 26, obtained by means of a Bristol automatic pressure gage. The river was frozen most of the time during January and February. The ice was breaking up Feb. 27, and the channel probably cleared soon after. Gage heights for Mar. 13 to April 10 have been estimated from those observed below Spring Creek.

Daily gage height, in feet, of Williamson River below Spring Creek, near Klamath Agency, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1							16	0.20					
2	0.70			1.10			17						
3							18						
4							19						0.0
5							20		0.10	1.90			
6		0.20	1.30			0.0	21						
7							22					1.5	
8					0.27		23	.17					
9	.60						24				0.35		
10				1.00			25						
11							26						.0
12						.0	27		.10	1.60			
13		.15	2.20				28						
14							29					.10	
15					.20		30	.25			.30		
							31						

NOTE.—Daily discharge determined by means of the gage heights at Rocky Ford and a fairly well-defined discharge rating curve—the same as that used for 1909. The measurement made during 1910 is believed not to be reliable. Discharge for January and February reduced by varying amounts to allow for effect of ice as indicated by the observer's notes; discharge interpolated between dates when gage was read.

Daily discharge, in second-feet, of Williamson River near Klamath Agency, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.
1	567	371	600	1,040	567	293
2	567	371	690	990	567	288
3	561	371	770	980	544	283
4	554	371	860	980	544	278
5	548	371	950	970	544	273
6	541	371	1,040	960	544	288
7	535	365	1,120	960	544	288
8	528	359	1,200	950	544	288
9	522	353	1,270	950	522	288
10	498	347	1,350	940	522	288
11	473	341	1,430	900	500	288
12	449	335	1,510	860	500	288
13	424	329	1,590	820	477	288
14	399	329	1,560	782	477	249
15	375	329	1,540	752	477	249
16	350	329	1,510	752	477	249
17	340	329	1,490	752	392	249
18	330	329	1,460	752	350	230
19	319	329	1,440	752	268	230
20	309	329	1,410	659	288	230
21	298	344	1,390	636	413	230
22	293	359	1,360	659	350	230
23	288	374	1,340	636	350	230
24	300	389	1,310	636	308	230
25	312	404	1,280	590	308	230
26	323	419	1,260	613	308	230
27	335	434	1,240	590	268	.....
28	347	520	1,200	567	268	.....
29	359	.....	1,160	567	308	.....
30	371	.....	1,120	567	303	.....
31	371	.....	1,080	.....	298	.....

Monthly discharge of Williamson River near Klamath Agency, Oreg., for 1910.

[Drainage area, 840 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	567	288	412	0.491	0.57	25,300	C.
February	520	329	364	.433	.45	20,200	C.
March	1,590	600	1,240	1.48	1.71	76,200	C.
April	1,040	567	785	.935	1.04	46,700	B.
May	567	268	424	.505	.58	26,100	B.
June 1–26	293	230	255	.304	.29	13,200	B.
The period	.....	.....	.....	.....	.....	208,000	

LOST RIVER AT OLENE, OREG.

This station was originally established May 24, 1904, at the county bridge at Olene in sec. 14, T. 39 S., R. 10 E., and was maintained until July 30 of that year, when the bridge at which measurements were made was destroyed and the station was discontinued. It was reestablished May 20, 1907, and the records have been continuous since that date. This station replaces the one at Merrill, simultaneous-

records being kept a sufficient length of time to make a comparison between the two. The difference of flow is largely accounted for by the inaccuracy of the data obtained at Merrill station.

A slough connecting Lost River with Klamath River joins Lost River 5 miles below the Olene station and Klamath River 2 miles below Lake Ewauna. Through this slough it is proposed to divert part of the waters from Lost River into Klamath River, and thus reclaim lands bordering Tule Lake. At present, however, the slough has been artificially closed and the flow has been shut off for several years. Before it was diked no water flowed except during high water, the direction depending upon whether Klamath or Lost River was the higher.

There is a small amount of inflow below Olene. One spring was measured April 14, 1908, giving a discharge of 2.9 second-feet, and during the irrigating season there is probably some waste water from irrigation. Nuss Lake is situated half a mile from the left bank of Lost River and 1 mile below Olene. It has no surface outlet except at flood time, but it is possible that a little water passes underground from this lake to the river during the summer months.

A hook gage has been used since April 23, 1909, in order to insure more accurate readings, the datum having remained the same.

Measurements are made from the highway bridge to which the gage is attached or at low water by wading. In defining the discharge curve the wading measurements have been given greater weight than low-water measurements at the bridge.

This station was maintained during 1910 by the United States Reclamation Service, but the tables of daily and monthly discharge were computed by the United States Geological Survey.

Discharge measurements of Lost River near Olene, Oreg., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 3[a]	L. Moser	35	61.6	4.45	90
Sept. 19[a]	....do	40	66.5	4.53	124
Dec. 7	....do	110	427	5.36	441
12	....do	140	836	8.22	2,610
13	....do	135	682	7.22	1,620

[a] Measured by wading.

Daily gage height, in feet, of Lost River at Olene, Oreg., for 1910.

[A. T. Wilson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	4.52	5.15	7.04	5.16	4.57	4.50	.....	4.45	4.47	4.50	4.51	4.77
2	4.50	5.10	9.06	5.14	4.57	4.49	.....	4.45	4.47	4.50	4.51	4.98
3	4.48	5.00	9.73	5.11	4.58	4.49	4.44	4.45	4.47	4.50	4.51	5.02
4	4.46	4.88	9.38	.....	4.59	4.49	4.44	4.45	4.47	4.50	4.51	5.74
5	4.45	4.70	8.46	5.18	4.60	4.48	4.44	4.42	4.47	4.50	4.51	6.22
6	4.44	4.60	7.66	5.04	4.62	4.48	4.44	4.35	4.47	4.50	4.51	5.62
7	4.42	4.62	7.12	4.98	4.66	4.48	4.44	4.35	4.47	4.50	4.51	5.36
8	4.42	4.66	6.77	4.93	4.69	4.48	4.44	4.35	4.47	4.50	4.52	5.39
9	4.41	4.64	6.53	4.90	4.68	4.48	4.44	4.37	4.47	4.50	4.52	5.36
10	4.40	4.64	6.46	4.87	4.66	4.48	4.42	4.38	4.47	4.50	4.52	6.17
11	4.40	4.65	6.42	4.84	4.64	4.48	4.42	4.40	4.47	4.50	4.52	7.82
12	4.40	4.64	6.40	4.82	4.64	4.48	4.42	4.40	4.48	4.50	4.52	8.73
13	4.40	4.68	6.38	4.80	4.60	4.48	4.42	4.40	4.53	4.50	.....	7.02
14	4.40	4.89	6.50	4.77	4.46	4.48	4.42	4.40	4.59	4.50	.....	6.02
15	4.40	5.06	6.50	4.74	4.44	4.48	4.42	4.41	4.58	4.50	.....	5.22
16	4.40	5.01	6.44	4.74	4.43	4.48	4.42	4.43	4.56	4.50	.....	5.22
17	4.40	4.92	6.34	4.72	4.50	4.48	4.42	4.44	4.52	4.50	.....	5.10
18	4.40	5.01	6.28	4.70	4.51	4.48	4.42	4.44	4.52	4.50	.....	4.98
19	4.39	5.06	6.22	4.68	4.51	4.48	4.42	4.44	4.52	4.50	.....	4.90
20	4.39	5.02	6.30	4.66	4.51	4.48	4.42	4.44	4.52	4.50	4.52	4.84
21	4.52	5.05	6.29	4.65	4.51	4.48	4.42	4.44	4.52	4.51	4.53	4.74
22	4.59	5.02	6.10	4.63	4.51	4.48	4.42	4.44	4.52	4.51	4.53	4.72
23	4.88	4.95	5.94	4.61	4.51	4.47	4.42	4.45	4.51	4.51	4.53	4.72
24	5.48	5.31	6.02	4.60	4.42	4.47	4.43	4.47	4.51	4.51	4.54	4.70
25	6.85	6.04	6.04	4.60	4.46	4.47	4.44	4.47	4.51	4.51	4.57	4.66
26	5.95	6.11	5.88	4.59	4.50	4.47	4.44	4.47	4.51	4.51	4.57	4.63
27	5.80	6.11	5.73	4.58	4.52	4.46	4.44	4.47	4.51	4.51	4.74	4.61
28	5.52	6.22	5.58	4.57	4.52	4.45	4.44	4.47	4.51	4.51	4.91	4.60
29	5.38	.....	5.42	4.56	4.52	4.44	4.45	4.47	4.50	4.51	4.85	4.60
30	5.31	.....	5.28	4.58	4.52	4.44	4.45	4.47	4.50	4.51	4.76	4.60
31	5.24	.....	5.21	.....	4.52	.....	4.40	4.47	.....	4.51	.....	4.60

NOTE.—No ice at this station.

Daily discharge, in second-feet, of Lost River at Olene, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	106	322	1,660	328	115	102	91	93	97	102	104	163
2	102	295	3,350	317	115	100	91	93	97	102	104	240
3	98	248	3,960	300	116	100	91	93	97	102	104	257
4	95	201	3,640	320	118	100	91	93	97	102	104	698
5	93	143	2,840	339	120	98	91	88	97	102	104	1,040
6	91	120	2,160	267	125	98	91	76	97	102	104	618
7	88	125	1,730	240	134	98	91	76	97	102	104	449
8	88	134	1,450	220	141	98	91	76	97	102	106	468
9	86	129	1,270	208	138	98	91	80	97	102	106	449
10	84	129	1,220	197	134	98	88	81	97	102	106	1,000
11	84	132	1,190	186	129	98	88	84	97	102	106	2,050
12	84	129	1,180	179	129	98	88	84	98	102	106	3,070
13	84	138	1,160	172	120	98	88	84	107	102	106	1,650
14	84	204	1,250	163	95	98	88	84	118	102	106	804
15	84	276	1,250	155	91	98	88	86	116	102	106	362
16	84	253	1,200	155	89	98	88	89	113	102	106	361
17	84	216	1,130	149	102	98	88	91	106	102	106	295
18	84	253	1,080	143	104	98	88	91	106	102	106	240
19	82	276	1,040	138	104	98	88	91	106	102	106	208
20	82	257	1,100	134	104	98	88	91	106	102	106	186
21	106	272	1,090	132	104	98	88	91	106	104	106	155
22	118	257	950	127	104	98	88	91	106	104	106	149
23	201	228	838	122	104	97	88	93	104	104	106	149
24	527	416	894	120	88	97	89	97	104	104	109	143
25	1,510	908	908	120	95	97	91	97	104	104	115	134
26	845	958	796	118	102	97	91	97	104	104	115	127
27	740	958	691	116	106	95	91	97	104	104	155	122
28	553	1,040	592	115	106	93	91	97	104	104	212	120
29	462	.....	488	113	106	91	93	97	102	104	190	120
30	416	.....	398	116	106	91	93	97	102	104	160	120
31	374	.....	356	.....	106	.....	84	97	.....	104	.....	120

NOTE.—Daily discharge determined from a rating curve fairly well defined between 100 and 2,500 second-feet.

Monthly discharge of Lost River at Olene, Oreg., for 1910.

[Drainage area, 1,290 a square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	1,510	82	246	0.191	0.22	15,100	B.
February	1,040	120	322	.250	.26	17,900	B.
March	3,960	356	1,380	1.07	1.23	84,800	B.
April	339	113	184	.143	.16	10,900	B.
May	141	88	111	.085	.10	6,820	B.
June	102	91	97.5	.076	.08	5,800	B.
July	93	84	89.5	.069	.08	5,500	B.
August	97	76	89.5	.069	.08	5,500	B.
September	118	97	103	.080	.09	6,130	B.
October	104	102	103	.080	.09	6,330	B.
November	212	104	116	.090	.10	6,900	B.
December	3,070	120	521	4.04	.47	32,000	B.
The year	3,960	76	282	.219	2.96	204,000	

a Including area above Clear Lake reservoir dam, 550 square miles, which strictly should be deducted, as no water was allowed to escape during 1910.

TULE LAKE NEAR MERRILL, OREG.

This station, which is located at J. F. Adam's ranch near the mouth of Lost River, in sec. 9, T. 41 S., R. 11 E., about 3 miles east of Merrill, was established May 17, 1904.

The elevation of the zero of the gage has been taken as 4,048.21 feet above sea level. When the station was established the gage was referred to a bench mark on a juniper post near by. The bench mark at that time was 13.7 feet above the zero of the gage. On October 21, 1904, this elevation was verified. On May 11, 1907, the elevation of the same bench mark was found to be 12.87 feet above zero of the gage, and was independently verified on June 11, 1907, and again on November 27, 1908. It appears, therefore, that sometime between October, 1904, and May, 1907, gage was raised 0.87 foot. This change was probably due to action of ice in the lake, although nothing of this kind has been observed since that time. Just when it occurred it has been impossible to ascertain, and a graph of the heights has failed to reveal any critical points that would account for a sudden change. It is therefore likely that the gage was raised a little at a time during the winters of 1905–6 and 1906–7.

On account of this error the gage heights prior to May, 1907, should not be used for refined studies.

The data for this station are furnished by the United States Reclamation Service.

Daily gage height, in feet, of Tule Lake near Merrill, Oreg., for 1910.

[J. F. Adams, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	7.95									6.50		
2				9.05			8.05					
3									6.80			6.70
4						8.50						
5		8.00	8.50								6.50	
6								7.50				
7					8.80							
8	7.95									6.50		
9				9.05			7.95					
10									6.70			6.80
11		8.00				8.40						
12			8.75								6.55	
13								7.40				
14					8.75							
15	7.95									6.55		
16				9.00			7.80					
17									6.65			6.90
18						8.30					6.60	
19		8.15	8.90									
20								7.20				
21					8.70							
22	7.95									6.55		
23				8.95			7.70					
24									6.50			7.00
25						8.10						
26		8.25	9.0								6.65	
27								7.00				
28					8.60							
29	7.95									6.50		
30				8.90			7.60					
31												7.00

NOTE.—The lake and lower Lost River were frozen from January 1 to about March 1. No ice noted in December.

MILLER CREEK NEAR LORELLA, OREG.

This station, which was established August 10, 1904, was originally located in sec. 13, T. 39 S., R. 13 E., at the lower end of Horsefly Valley. On April 1, 1909, it was moved to an old highway bridge in sec. 7, T. 40 S., R. 14 E., 3 miles south of Lorella post office and 1 mile east of the Swingle ranch in Langell Valley. All measurements in 1909 were referred to this gage. Both points are below all tributaries and the results should be comparable, although the drainage area at the lower station is 50 square miles greater than at the upper, the areas being 270 and 220 square miles, respectively.

A small amount of water is diverted for irrigation by a dam about one-fourth mile above the present station.

A vertical staff gage is attached to the bridge, and its datum has remained unchanged since the station was re-established. A Bristol self-recording pressure gage was installed May 2, 1909; the records obtained from it have been used during high water, but during low stages it was too much affected by temperature changes and the weekly readings of the staff gage have been used. The Bristol gage was replaced by a Friez recording gage on January 30, 1910, and since that time the gage heights have been fully reliable.

Discharge measurements are made from the highway bridge or by wading at low water.

During the winter months the river freezes over completely, and the data obtained at such periods are not reliable, but a large error during such periods is admissible without affecting the total annual flow. At flood stages, even during the winter, the relation between gage height and discharge is probably not affected by ice.

The conditions at the station during the open season are favorable for good results. A riffle that controls the flow just below the station seems to have shifted slightly during the spring flood of 1910.

High water measurements made 1911 indicate that the computed flood discharge of November, 1909, is considerably too small, but the yearly total is not materially affected thereby.

The 1911 measurements are published herewith, as they have been used in constructing the discharge rating curve.

This station was maintained during 1910 by the United States Reclamation Service, but the tables of daily and monthly discharge were computed by the United States Geological Survey.

Discharge measurements of Miller Creek near Lorella, Oreg., in 1910–11.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
1910.		*Feet.*	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Aug. 2	Yadon and Moser	.....	.....	2.55	[a] 1.25
1911.					
Mar. 21	Leland Moser	65	576	6.40	990
21	.....do	65	581	6.65	1,080
29	.....do	65	665	7.55	1,800
31	.....do	65	583	6.65	1,080
31	.....do	75	746	8.05	2,160
Apr. 6	.....do	65	602	6.65	1,110
16	.....do	60	499	4.90	334
May 3	.....do	40	58	3.90	88

[a] Discharge estimated. [b] Measured by wading.

Daily gage height, in feet, of Miller Creek near Lorella, Oreg., in 1910.

[M. L. Anderson, observer.]

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1.....	2.20	3.95	8.50	4.24	2.85	2.95	2.66	2.60	2.65	2.70	2.81	4.30
2.....	2.40	3.75	7.10	4.10	2.96	2.95	2.70	2.60	2.65	2.69	2.81	5.35
3.....	2.40	3.56	6.70	4.02	3.12	2.94	2.70	2.60	2.60	2.68	2.82	6.40
4.....	2.20	3.20	7.00	3.95	3.22	2.80	2.70	2.60	2.60	2.78	2.82	5.52
5.....	2.40	3.00	6.80	3.85	3.18	2.78	2.70	2.60	2.60	2.79	2.81	4.90
6.....	2.60	3.08	6.40	3.76	3.06	2.78	2.70	2.58	2.61	2.78	2.81	4.50
7.....	2.50	3.08	6.10	3.65	2.98	2.77	2.70	2.59	2.62	2.75	2.82	4.10
8.....	2.50	3.08	6.05	3.56	2.89	2.75	2.70	2.60	2.62	2.73	2.92	6.00
9.....	2.00	3.08	6.10	3.50	2.78	2.74	2.70	2.61	2.62	2.70	2.88	6.20
10.....	1.80	3.08	6.10	3.45	2.72	2.71	2.70	2.63	2.61	2.70	2.87	7.05
11.....	1.80	3.15	6.15	3.45	2.65	2.70	2.70	2.64	2.61	2.70	2.89	5.25
12.....	2.00	3.18	6.20	3.50	2.59	2.70	2.65	2.66	2.62	2.78	2.90	4.30
13.....	2.30	3.70	6.10	3.37	2.48	2.70	2.65	2.68	2.63	2.80	2.89	4.10
14.....	2.30	3.42	6.10	3.25	2.35	2.70	2.62	2.69	2.66	2.79	2.88	4.02
15.....	2.10	3.38	6.00	3.15	2.28	2.72	2.62	2.70	2.70	2.78	2.86	3.95

Daily gage height, in feet, of Miller Creek near Lorella, Oreg., in 1910—Continued.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
16	1.60	3.22	5.80	3.06	2.22	2.76	2.60	2.70	2.72	2.80	2.85	3.73
17	1.80	3.18	5.90	2.98	2.19	2.78	2.60	2.71	2.71	2.80	2.87	3.60
18	1.90	3.00	6.00	2.90	2.52	2.78	2.60	2.70	2.71	2.80	2.90	3.43
19	1.70	2.90	6.18	2.81	2.90	2.78	2.61	2.70	2.72	2.80	2.90	3.45
20	2.00	2.90	5.54	2.74	2.95	2.76	2.63	2.70	2.73	2.80	2.99	3.45
21	3.20	2.90	5.15	2.71	2.98	2.75	2.64	2.70	2.75	2.80	3.01	3.45
22	6.10	2.90	5.35	2.70	2.96	2.75	2.63	2.70	2.74	2.80	3.05	3.45
23	6.20	2.90	5.40	2.68	2.92	2.75	2.60	2.68	2.72	2.80	3.80	3.45
24	4.60	3.20	5.00	2.60	2.90	2.74	2.60	2.62	2.70	2.80	4.30	3.45
25	4.20	4.40	4.90	2.55	2.91	2.70	2.60	2.59	2.70	2.80	4.45	3.00
26	3.80	4.10	4.65	2.48	2.94	2.67	2.60	2.58	2.70	2.80	4.30	3.00
27	4.10	4.30	4.62	2.50	2.92	2.66	2.60	2.60	2.70	2.80	4.30	2.99
28	4.10	6.60	4.42	2.47	2.90	2.65	2.60	2.60	2.70	2.80	4.00	2.99
29	4.30	.....	4.22	2.52	2.88	2.65	2.60	2.60	2.70	2.80	4.18	2.98
30	4.20	.....	4.16	2.71	2.85	2.65	2.60	2.62	2.70	2.80	4.10	2.96
31	4.10	.....	4.15	.....	2.89	.....	2.60	2.64	.....	2.80	.....	2.80

NOTE.—Gage heights obtained from a Bristol automatic pressure gage until January 30, and from a Friez gage thereafter. The low readings for January 9 to 20 were probably caused by the low temperature and not by low stage of water. No ice noted; the creek freezes over at the bridge, but probably not at the riffle control, so that gage readings may not be materially affected.

The low water readings are not very accurate as the pen of the Friez gage was evidently set only to the nearest tenth of a foot.

Daily discharge, in second-feet, of Miller Creek near Lorella, Oreg., for 1910.

Day.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1	2	111	2,620	148	6	8	3	2	2	3	5	160
2	3	84	1,410	122	9	8	3	2	2	3	5	447
3	3	61	1,120	109	14	8	3	2	2	3	5	940
4	2	26	1,330	98	18	5	3	2	2	5	5	508
5	3	14	1,190	83	16	5	3	2	2	5	5	306
6	5	18	940	71	12	5	3	2	2	5	5	202
7	4	18	770	58	9	4	3	2	2	4	5	122
8	4	18	745	49	7	4	3	2	2	4	8	720
9	2	18	770	43	5	4	3	2	2	3	7	820
10	2	18	770	38	3	3	3	2	2	3	6	1,370
11	2	22	795	38	2	3	3	2	2	3	7	413
12	2	25	820	43	2	3	2	3	2	5	7	160
13	2	78	770	30	1	3	2	3	2	5	7	122
14	2	46	770	20	0	3	2	3	3	5	7	109
15	2	42	720	15	0	3	2	3	3	5	6	98
16	2	28	620	12	0	4	2	3	3	5	6	68
17	2	25	670	9	0	5	2	3	3	5	6	53
18	2	14	720	7	1	5	2	3	3	5	7	36
19	2	11	810	5	7	5	2	3	3	5	7	38
20	2	11	516	4	8	4	2	3	4	5	10	38
21	26	11	380	3	9	4	2	3	4	5	10	38
22	770	11	447	3	9	4	2	3	4	5	12	38
23	820	11	464	3	8	4	2	3	3	5	76	38
24	238	26	334	2	7	4	2	2	3	5	160	38
25	152	192	306	2	7	3	2	2	3	5	191	10
26	90	134	239	1	8	3	2	2	3	5	160	10
27	134	172	231	1	8	3	2	2	3	5	160	10
28	134	1,060	184	1	7	2	2	2	3	5	106	10
29	172	.....	144	1	7	2	2	2	3	5	136	9
30	152	.....	133	3	6	2	2	2	3	5	122	9
31	134	.....	131	.....	7	.....	2	2	.....	5	.....	5

NOTE.—Daily discharge determined from two fairly well-defined discharge rating curves based on 8 measurements made in 1909, 1 in 1910, and 8 in 1911. Low water records are poor on account of uncertain gage heights.

Monthly discharge of Miller Creek near Lorella, Oreg., for 1910.

[Drainage area, 270 square miles.]

Month.	Discharge in second-feet.				Run-off.		Accuracy.
	Maximum.	Minimum.	Mean.	Per square mile.	Depth in inches on drainage area.	Total in acre-feet.	
January	820	2	92.6	0.343	0.40	5,690	C.
February	1,060	11	82.3	.305	.32	4,570	B.
March	2,620	131	705	2.61	2.01	43,300	A.
April	148	1	34.1	.126	.14	2,030	B.
May	18	0	6.5	.024	.03	400	C.
June	8	2	4.1	.015	.02	244	C.
July	3	2	2.4	.0089	.01	148	C.
August	3	2	2.4	.0089	.01	148	C.
September	4	2	2.7	.010	.01	161	C.
October	5	3	4.5	.017	.02	277	C.
November	191	5	42.0	.156	.17	2,500	B.
December	1,370	5	224	.830	.96	13,800	B.
The year	2,620	0	101	.374	5.10	73,300	

EAST FORK OF SCOTT RIVER NEAR CALLAHAN, CAL.

Scott River rises in the Scott Mountains in the southern part of Siskiyou County, and flows northwestward to its junction with Klamath River near Hamburg Bar. The length of the main river from the junction of the South and East forks near Callahan is about 50 miles. The basin is narrow and the tributaries are small. Scott Valley, extending from Fort Jones to French Gulch, is a rich agricultural valley. Below this valley the river enters a canyon in which it continues to its mouth.

The gaging station, which is located 500 feet west of W. Schneider's ranch house, 6 miles east of Callahan, in sec. 18., T. 40 N., R. 7 W., in the Shasta National Forest, was established November 1, 1910.

The gage is a vertical staff fastened to a willow tree on the left bank.

Discharge measurements are made from the foot log 30 feet below the gage.

This station is maintained in cooperation with the United States Forest Service.

No estimates of daily or monthly discharge have been prepared for 1910.

Discharge measurements of East Fork of Scott River near Callahan, Cal., in 1910.

Date.	Hydrographer.	Width.	Area of section.	Gage height.	Discharge.
		Feet.	*Sq. ft.*	*Feet.*	*Sec.-ft.*
Oct. 13	W. V. Hardy	5	1.5	(a)	0.5
Nov. 23	F. G. Wood	12	8.0	3.22	14

a No gage installed.

NOTE.—Measurements made by wading below foot bridge.

Daily gage height, in feet, of East Fork of Scott River near Callahan, Cal., for 1910.

[F. P. Cunningham, observer.]

Day.	Nov.	Dec.	Day.	Nov.	Dec.	Day.	Nov.	Dec.
1	2.95	.....	11	3.1	3.7	21	.....	.....
2	3.0	3.3	12	.....	.....	22	.....	.....
3	.....	3.4	13	.....	.....	23	3.2	.....
4	3.0	3.5	14	.....	.....	24	3.45	.....
5	.....	3.4	15	.....	.....	25	3.3	.....
6	.....	3.3	16	.....	.....	26	3.25	.....
7	3.0	3.25	17	.....	.....	27	3.25	.....
8	.....	3.3	18	.....	.....	28	.....	.....
9	.....	3.5	19	.....	.....	29	.....	.....
10	3.0	3.6	20	.....	.....	30	.....	.....
						31	.....	3.2

TRINITY RIVER NEAR TRINITY CENTER, CAL.

This station, which is located 500 feet below the highway bridge 2 miles southeast of Trinity Center, in the NE. ¼ sec. 16, T. 36 N., R. 7 W., in the Shasta National Forest, was established December 15, 1910.

Brush Creek enters about one-half mile and Coffee Creek about 6½ miles above the station. Swift Creek enters 1 mile below. The East Fork of Trinity River joins the main stream about three-fourths mile below the station.

The gage is a vertical staff on the right bank.

Discharge measurements are made from the bridge 500 feet above the gage.

A small amount of water, diverted from the North Fork of Swift Creek for placer mining, enters a short distance above the station. Otherwise the record at this point represents the natural run-off from this drainage area.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood, from bridge. December 15, 1910:

Width, 134 feet; area, 151 square feet; gage height, 3.47 feet; discharge, 509 second feet.

Daily gage height of Trinity River near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 15	3.47	24	....
16	3.3	25	....
17	....	26	3.05
18	....	27	....
19	3.2	28	3.0
20	....	29	....
21	3.2	30	2.9
22	....	31	2.9
23	3.2		

COFFEE CREEK AT COFFEE, CAL.

This station, which is located at a private bridge at Coffee, 6 miles above the mouth of the Creek, in the NW. ¼ sec. 4, T. 37 N., R. 8 W., in the Shasta National Forest, was established December 16, 1910. Boulder Creek enters 400 feet above and Little Boulder Creek 1¼ miles below the station.

The gage is a vertical staff on the right support of the bridge.

Discharge measurements are made from the bridge.

This stream is utilized by the Trinity Gold Mining & Reduction Co. to operate the mine near Carrville. At certain times of the year the operation of two "self-shooter" dams above the station may affect the accuracy of the records. Each of these dams is controlled by a gate which opens when the desired head is reached. As soon as the reservoir is emptied, (the larger one in about half an hour) the gate closes automatically. These dams are used in connection with the placer mining.

This station is maintained in cooperation with the U. S. Forest Service.

The following discharge measurement was made by F. G. Wood. December 16, 1910:

Width, 41 feet; area, 148 square feet; gage height, 4.17 feet; discharge, 176 second feet.

Daily gage height of Coffee Creek at Coffee, Cal., for 1910.

[F. H. Williams, observer.]

	Feet.		Feet.
Dec. 16	4.17	Dec. 24	3.87
17	4.15	25	3.86
18	4.15	26	3.86
19	4.00	27	3.84
20	3.92	28	3.82
21	3.90	29	3.80
22	3.88	30	3.78
23	3.87	31	3.75

EAST FORK OF TRINITY RIVER NEAR TRINITY CENTER, CAL.

This station, which is located at the highway bridge 3 miles southeast of Trinity Center and one-fourth mile above the junction with Trinity River, in the SW. ¼ sec. 15, T. 36 N., R. 7 W., in the Shasta National Forest, was established December 15, 1910.

The gage is a vertical staff on the downstream end of the left abutment of the bridge.

Discharge measurements are made from the bridge.

The water of this stream is used to irrigate about 425 acres of land. The principal diversion canal, that belonging to the Trinity Farm & Cattle Co., heads about 4 miles above the station.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood. December 15, 1910:

Width, 50 feet; area, 144 square feet; gage height, 4.77 feet; discharge, 238 second feet.

Daily gage height of East Fork of Trinity River near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 15	4.77	Dec. 24	....
16	....	25	....
17	4.5	26	4.0
18	....	27	....
19	4.3	28	4.0
20	....	29	....
21	4.2	30	4.05
22	....	31	4.0
23	4.15		

SWIFT CREEK NEAR TRINITY CENTER, CAL.

This station, which is located one-fourth mile above the mouth of the North Fork of Swift Creek, 2½ miles south of Trinity Center, in the E. ½ sec. 13, T. 36 N., R. 8 W., in the Shasta National Forest, was established December 17, 1910.

No water is diverted above the station. Water is diverted below for placer mining in the vicinity of Trinity Center.

The gage is a vertical staff fastened to a cedar tree on the left bank.

Discharge measurements are made from a foot log 100 feet above the gage.

This station is maintained in cooperation with the United States Forest Service.

The following discharge measurement was made by F. G. Wood from foot log 100 feet above gage:

December 17, 1910: Width, 48 feet; area, 63 square feet; gage height, 2.09 feet; discharge, 133 second feet.

Daily gage height of Swift Creek near Trinity Center, Cal., for 1910.

[Fred Hansen, observer.]

	Feet.		Feet.
Dec. 17	2.09	Dec. 25	
18		26	
19		27	1.7
20	2.0	28	
21		29	1.7
22	1.9	30	
23		31	1.65
24	1.9		

MISCELLANEOUS MEASUREMENTS.

The following miscellaneous discharge measurements have been made on streams of the Pacific coast in California during 1910. They are arranged in the same order of drainage basins as the regular stations:

Miscellaneous discharge measurements in south Pacific Ocean drainage basins in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 11	Cajon Creek.....	Santa Ana River..	Below junction with Lone Pine Creek and above diversion of Muscoy Water Co. to Glen Helen Farm. Near north line of sec. 13, T. 2 N., R. 6 W.	.....	4.8
June 20	West Fork of San Gabriel River.	San Gabriel River.	At weir 100 feet above junction with North Fork.	.....	8.5
20	North Fork of West Fork of San Gabriel River.	.....do.....	At weir about 500 feet above mouth.	.....	7.2
Apr. 7	Arroyo Seco.....	Los Angeles River.	At mouth of Millard Canyon, 4 miles north of Pasadena, Cal.	.....	7.7
June 6	.....do.....	.....do.....	In flume at intake North Pasadena Land & Water Co. Includes total flow of stream.	.....	2.0
28	.....do.....	.....do.....	In flume at intake of North Pasadena Land & Water Co. Includes total flow of Arroyo Seco above Millard Canyon. No water flowing from Millard Canyon into the Arroyo Seco.	.....	1.2

Miscellaneous discharge measurements in San Joaquin River drainage basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 5[a]	Kern River Power Canal.	Diverts from Kern River.	At Isabella, Cal.....	4.16	2.28
Nov. 21[b]	.....do.....	.....do.....	.....do.....	4.38	2.52
Sept. 20	North Fork of Kings River.	Kings River.....	Wading 100 feet above gage, 19 miles east, and 6 miles south of Ockenden, Cal.	4.0	1.7
Oct. 9	Bear Creek.....	Tule River.....	At mouth near Daunt, Cal.....	.....	c.2
Aug. 20	Tule ditch.....	Diverts from Tule River.	Opposite gaging station on Tule River near McFarland's ranch.	.....	1.6
Nov. 6	South Fork of Merced River.	Merced River.....	Below junction of Big Creek.....	.....	20
6	.....do.....	.....do.....	Above junction of Big Creek.....	.....	10
Aug. 25[d]	Tuolumne River...	San Joaquin River.	Foot bridge, head of Hetch Hetchy Valley.	[e] 1.00	105
25[d]	.....do.....	.....do.....	Dam site in Hetch Hetchy Valley ...	.....	115
Sept. 13	.....do.....	.....do.....	Wading 1 mile below Lumden's Bridge, about 50 feet above mouth of South Fork of Tuolumne River.	.....	46
Aug. 24[d]	Piute Creek.....	Tuolumne River.,	Footbridge head of Pleasant Valley..	[f] .32	3.2
26[d]	Outlet of Lake Eleanor.	.....	Sack dam	.....	2.6
26[d]	Eleanor Creek.....	.....do.....	½ mile below outlet of Lake Eleanor.	.....	3.8
Sept. 8	Stanislaus River...	San Joaquin River.	Wading 200 feet above power house No. 9, Stanislaus Electric Power Co., below mouth of North Fork of Stanislaus River.	.....	13
Oct. 25	.....do.....	.....do.....	.....do.....	.....	24

[a] From data furnished by Kern River Power Co.
[b] Soundings considered unreliable because of light weight used and high velocities encountered
[c] Estimated.
[d] Made by R. D. Robertson, United States irrigation investigations.
[e] Gage nailed on bent of bridge.
[f] Gage is a quaking aspen nailed to bent of bridge.

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.ft.*
Oct. 9	Sacramento River.	San Francisco Bay.	Upstream side of steel bridge on wagon road from Sisson, Cal., to Brown's ranch; sec. 29, T. 4 N., R. 4 W.	.....	11
9	Wagon Creek.....	Sacramento River.	At logging road trestle; wagon road from Sisson, Cal., to Brown's ranch; sec. 29, T. 40 N., R. 4 W.	.....	38
Sept. 23	Pit River.....	.....do.....	At bridge, 300 feet south of Pittville; sec. 18, T. 37 N., R. 6. E.	.....	31
24	.....do.....	.....do.....	At Pecks bridge, near Cayton, Cal.; sec. 21, T. 37 N., R. 3 E.	.....	2,770
23	Fall River.....	Pit River.....	At wagon bridge, upstream side, near Fall River Mills; sec. 31, T. 37 N., R. 4 E.	.....	1,470
22	Hat Creek.....	.....do.....	At bridge near Carbon, Cal., sec. 20, T. 36 N., R. 4 E.	.....	701
21	Rising River.....	Hat Creek.....	At bridge, road from Hat Creek to Cassel, near Cassel post office; sec. 8, T. 35 N., R. 4 E.	.....	421
25	Burney Creek.....	Pit River.....	Wading, 1½ miles above Burney post office; sec. 26, T. 35 N., R. 2 E.	.....	20
25	.....do.....	.....do.....	Log footbridge below falls and near junction with Pit River; sec. 29, T. 37 N., R. 3 E.	.....	246
23	Cayton Creek.....	.....do.....	Wading, 20 feet above bridge on wagon road from Fall River to Pecks Bridge near Cayton Valley; sec. 15, T. 37 N., R. 3 E.	.....	4.6
24	Clark Creek.....	.....do.....	Wading, near mouth, near Pecks Bridge; sec. 19, T. 37 N., R. 3 E.	.....	8.9
27	Nelson Creek.....	.....do.....	At wagon bridge about ½ mile above junction with Pit River, near Henderson, Cal.; sec. 31, T. 37 N., R. 1 E.	.....	23
27	Baker Creek.....	Kosk Creek.....	Wading, ½ mile east of ranger's camp near Henderson, Cal.; sec. 24, T. 37 N., R. 1 W.	.....	16
25	Hatchet Creek.....	Pit River.....	Downstream side bridge on road from Burney to Montgomery Creek, Cal., about 7 miles from latter; sec. 19, T. 35 N., R. 1 E.	.....	19
26	Hatchet Creek.....	Pit River.....	Downstream side bridge on Cove road from Montgomery Creek to Henderson, Cal.; sec. 24, T. 35 N., R. 1 W.	.....	37
26	Roaring Creek.....	Hatchet Creek....	At bridge on Cove road from Montgomery to Henderson, Cal., near Montgomery Creek; sec. 14, T. 35 N., R. 1 W.	.....	15
26	Montgomery Creek.	Pit River.....	Downstream side wagon bridge south of hotel, Montgomery Creek post office, Cal.; sec. 36, T. 35 N., R. 1 W.	.....	22
Oct. 16	Squaw Creek.....	.....do.....	At footbridge at Copper City, Ydalpom post office; sec. 28, T. 34 N., R. 3 W.	.....	19
Nov. 17	.....do.....	.....do.....	At footbridge, ½ mile southwest of Copper City, Ydalpom post office; sec. 29, T. 34 N., R. 3 W.	2.08	23
Oct. 3	Cow Creek.....	Sacramento River.	Downstream side bridge at Millville, Cal.; sec. 14, T. 31 N., R. 3 W.	.....	65
Sept. 19	North Fork of Cow Creek.	Cow Creek.....	Wading, 150 feet above wagon bridge, about 11 miles northeast of Millville, Cal., on Tamarack road, above diversion of irrigation ditch, near section line between secs. 16 and 21, T. 32 N., R. 1 W.	.....	42
20	Old Cow Creek....	South Fork of Cow Creek.	Wading, 50 feet above Tamarack road crossing near Whitman, Cal.; sec. 27, T. 33 N., R. 2 E.	.....	4.5
Oct. 3	Clover Creek.....	Cow Creek.....	Wading, 300 feet above bridge on road from Millville to Palo Cedro, near Millville, Cal.; sec. 10, T. 31 N., R. 3 W.	.....	9.0
3	Oak Run Creek....	.....do.....	Wading, ½ mile above bridge on road from Millville to Palo Cedro, near Millville, Cal.; sec. 3, T. 31 N., R. 3 W.	.....	2.2

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910—Con.

Date.	Stream.	Tributary to—	Locality.	Gate height.	Discharge.
				Feet.	*Sec.-ft.*
Oct. 2	Little Cow Creek..	Cow Creek.....	Wading, 200 feet above hotel near Ingot, Cal.; sec. 1, T. 33 N., R. 2 W.	.....	12
3	.....do.....	.....do.....	Wading, 80 feet below bridge, 1¼ miles east of Palo Cedro, Cal.; sec. 5, T. 31 N., R. 3 W.	.....	13
Sept. 19	Bear Creek.....	Sacramento River.	At bridge on county road between Balls Ferry and Millville, Cal.; sec. 15, T. 30 N., R. 3 W.	.....	45
Oct. 3	.....do.....	.....do.....	.....do.....	.....	38
Sept. 18	Battle Creek.....	.....do.....	Wading, at ford 1½ miles below lower power plant, Northern California Power Co., near Balls Ferry, Cal.; sec. 1, T. 29 N., R. 3 W.	.....	396
Oct. 4	.....do.....	.....do.....	.....do.....	.....	405
Sept. 17	Antelope Creek....	.....do.....	Wading, ½ mile above diversion dam of Red Bluff city waterworks, about 10 miles east of Red Bluff, Cal.	.....	56
12	Deer Creek.....	.....do.....	At sheep bridge, about 8 miles northeast of Vina, Cal., near mouth of canyon; sec. 23, T. 25 N., R. 1 W.	.....	116
29	North Fork of Feather River.	Feather River.....	½ mile above Ganzners.....	.....	766
21	Indian Creek.....	North Fork of Feather River.	400 feet below old Government gage (near Crescent Mills), at outlet of valley.	1.30	67
23	East Branch of Feather River (Indian Creek).	.....do.....	At ford near mouth.....	.....	212
23	.....do.....	.....do.....	150 yards above mouth.....	.....	224
29	.....do.....	.....do.....	At mouth.....	.....	204
21	Spanish Creek.....	Indian Creek.....	At Pocket, Cal., 50 yards above bridge.	.....	41
22	Mill Creek.....	Spanish Creek.....	25 feet above wagon bridge.....	.....	9
23	Yellow Creek.....	North Fork of Feather River.	At trail crossing, 150 yards above mouth.	.....	106
24	Chip Creek.....	.....do.....	At mouth.....	.....	22
24	Milk Ranch Creek.	.....do.....	100 feet below wagon bridge.....	.....	5
24	Bucks Creek.....	.....do.....	100 yards above mouth.....	.....	19
25	Rock Creek.....	.....do.....	Mouth.....	.....	5.5
26	Grizzly Creek.....	.....do.....	200 feet above mouth.....	.....	18
25	Camp Creek.....	.....do.....	At wagon bridge.....	.....	5
27	French Creek.....	.....do.....	1,000 feet above railroad bridge.....	.....	28
27	Berry Creek.....	.....do.....	60 feet above mouth.....	.....	5
20	Middle Fork of Feather River.	.....do.....	Opposite Langhorst's.....	.....	64
Oct. 3	.....do.....	.....do.....	½ mile above Little North Fork.....	.....	184
4	.....do.....	.....do.....	200 feet above Western Pacific Railroad bridge.	.....	230
Sept. 18	.....do.....	.....do.....	Bidwells Bar, Cal.....	.....	439
20	Nelson Creek.....	Middle Fork of Feather River.	50 yards above wagon bridge.....	.....	51
Oct. 3	Little North Fork.	.....do.....	At mouth.....	.....	23
Sept. 19	South Fork of Feather River.	.....do.....	At Little Grass Valley.....	.....	3
18	.....do.....	.....do.....	At Enterprise, Cal.....	.....	13
18	Palermo Land & Water Co.'s canal.	Diverts from South Fork of Feather River.	.....do.....	.....	34
16	North Fork of Yuba River.	Middle Fork of Yuba River	At bridge at Downieville, Cal.....	(a)	b421
12	.....do.....	.....do.....	Wading, at Bullards Bar, Cal.....	.....	195
Dec. 9	Davis Ditch.....	Diverts from North Fork of Yuba River.	Near power house at Downieville, Cal.	.....	3.5
Sept. 14	Rock Creek.....	North Fork of Yuba River.	Wading, above footbridge below junction of Woodruff Creek near Goodyear Bar, Cal.	.....	.6
Oct. 31	Woodruff Creek ...	.....do.....	Wading, about 50 feet above mouth, near Goodyear Bar, Cal.	.....	.7
Sept. 14	Goodyear Creek ...	.....do.....	Wading, at Goodyear Bar, Cal.....	(c)	d7.1
Oct. 28	Willow Creek.....	.....do.....	Mouth, at Bullards Bar, Cal.....	.....	e4
28	Little Oregon Creek.	.....do.....	.....do.....	.....	e2.5

a Water surface 17.37 feet below center of spike head, upstream side of bridge, near right bank.
b For sections over 6 feet in depth subsurface method used, reduction coefficient 0.85.
c Water surface 15.97 feet below bottom of notch cut in top of guard-fence rail of bridge, upstream side, 15 feet from right bank.
d Included 0.6 second-foot discharge in irrigating ditch diverting from Goodyear Creek, ¾ mile above point of measurement.
e Estimated.

Miscellaneous discharge measurements in Sacramento River drainage basin in 1910—Con.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Sept. 22	Middle Fork of Yuba River.	Yuba River	Wading, 300 feet above bridge at Freemans Crossing, near North San Juan, Cal.	.....	41
20	South Fork of Yuba River	do	Wading, just below wagon bridge, at Washington, Cal.	.....	41
Oct. 24	South Fork of American River.	American River	Wading, 1 mile northwest of Pacific, Cal.	.....	11

NOTE.—Miscellaneous measurements made on the North, Middle, and South forks of Feather River and their tributaries as given above are published as furnished by outside parties.

Miscellaneous discharge measurements in north Pacific Ocean drainage basins in California in 1910.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 11	Russian River	Pacific Ocean	At wagon bridge 1 mile north of Calpella, Cal.	.....	0.7
12	do	do	At bridge at Cloverdale, Cal.	.....	[a]6.6
11	East Fork of Russian River.	Russian River	Wading at mouth, 3 miles north from Ukiah, Cal.	.....	[a]3.5
13	Eel River	Pacific Ocean	Wading at Dyerville, Cal., ½ mile above junction of South Fork of Eel River; sec. 26, T. 1 S., R. 2 E., H. M.	.....	28
14	South Eel River	Eel River	Wading 500 feet above junction with Middle Fork of Eel River; sec. 31, T. 22 N., R. 13 W., M. D. M.	.....	5.3
14	Middle Fork of Eel River.	South Eel River	Wading above junction with South Eel River; sec. 31, T. 22 N., R. 13 W., M. D. M.	.....	8.3
Sept. 5	South Fork of Eel River.	Eel River	Wading 300 feet below bridge, 1 mile south of Garberville, Cal.	.....	38
Aug. 13	do	do	Wading 500 feet above mouth at Dyerville, Cal.; sec. 26, T. 1 S., R. 2 E., H. M.	.....	36
14	Van Duzen River	do	Wading 200 feet below bridge ½ mile south of Alton, Cal.; sec. 23, T. 2 N., R. 1 W., H. M.	.....	5.1
Sept. 2	Redwood Creek	Pacific Ocean	Wading 300 feet below bridge at Orick, Cal.; sec. 4, T. 10 N., R. 1 E., H. M.	.....	6.9
Aug. 26	Klamath River	do	Wading 300 feet above Martins Ferry below Weitchpec, Cal.; sec. 5, T. 9 N., R. 4 E., H. M.	.....	2,350
8	Barclay Springs	Upper Klamath Lake.		.....	1.7
10	Cream Creek	do	Near Sevenmile Creek	.....	12.3
10	Cherry Creek	do	Odessa road	.....	10
10	Sevenmile Creek	do	Looseley ranch	.....	82
11	Rock Creek	do	5 miles southeast of Odessa	.....	13
Sept. 24	do	do	Pelican Bay	.....	7.3
24	Jones Creek	do	do	.....	2.5
Aug. 10	Wood River	do	Fort Klamath	.....	339
11	Fort Creek	Wood River	do	.....	120
10	Crooked Creek	do	Klamath Agency	.....	110
July 26	Cottonwood Creek	Lower Klamath Lake.	"JF" ranch	.....	2
Sept. 20	do	do	do	.....	16
July 26	Willow Creek	do	Davis school	.....	9.7
Sept. 21	do	do	do	.....	16
20	Sheepy Creek	do	Lower marsh	.....	35
Oct. 12	Scott River	Klamath River	300 feet below wagon bridge, 1 mile below Callahan, Cal.	.....	21
Nov. 22	do	do	do	[b]	63
Dec. 19	Trinity River	do	At highway bridge at Lewiston, Cal.; NE. ¼ sec. 19, T. 33 N., R. 8 W., M. D. M.	[c]3.62	782

[a] All water in Russian River this date, coming from East Fork. Water standing in pools in West Fork at junction.

[b] Water surface 14.35 feet below top of steel chord at second vertical from right abutment, upstream side.

[c] Gage height reduced to same datum as gage installed Aug. 28, 1911.

Miscellaneous discharge measurements in north Pacific Ocean drainage basins in California in 1910—Continued.

Date.	Stream.	Tributary to—	Locality.	Gage height.	Discharge.
				Feet.	*Sec.-ft.*
Aug. 24	Trinity River	Klamath River	Wading 50 feet above junction with South Fork of Trinity River; sec. 14, T. 6 N., R. 5 E., H. M.	.....	275
22	.....do.....	.....do.....	Wading ½ mile below ferry at Hoopa, Cal., in Indian reservation.	.....	345
Dec. 17	Trinity Gold Mine & Reduction Co.'s flume.	Diverts from Coffee Creek.	In flume, 100 feet above fore bay and below last waste; near Carrville, Cal.	.....	34
Aug. 23	South Fork of Trinity River.	Trinity River	Wading 50 feet below suspension bridge above mouth; sec. 15, T. 6 N., R. 5 E., H. M.	.....	74
24	Willow Creek	.....do.....	At mouth, at China Flat, Cal.	.....	[a] 1.7
24	Campell Creek	.....do.....	At bridge near mouth near south boundary Hoopa Indian Reservation.	.....	[b] 1.0 [c] 2.0
24	Supply Creek	.....do.....	At bridge at Hoopa, Cal., Indian reservation.	.....	

[a] Estimated. About 2 second-feet diverted above bridge for mining purposes.
[b] Estimated.
[c] Diversion is made above bridge for domestic use at Hoopa.

INDEX.

A.

Page.

Accuracy of discharge measurements, degree of 15–16
Acknowledgments to those aiding 18–19
Acre-foot, definition of 12
Alton, Cal.,
  Vanduzen River near:
    discharge 202
American River basin, description of 164
  stream flow in 164–166
American River near—
  Fairoaks, Cal.:
    description 164
    discharge 165
    discharge, daily 166
    discharge, monthly 166
    gage heights 165
American River (South Fork) near—
  Pacific, Cal.:
    discharge 202
Antelope Creek near—
  Red Bluff, Cal.:
    discharge 201
Antler, Cal.,
  Sacramento River at:
    description 120
    discharge 120
    gage heights 120
Appropriations, amount of 7
Arcata, Cal.,
  Mad River near:
    description 177
    discharge 177
    gage heights 178
Arroyo Seco at or near—
  North Pasadena Land & Water Co's flume:
    discharge 199
  Pasadena, Cal.:
    description 51
    discharge 52, 199
    gage heights 52
  Soledad, Cal.:
    description 56–57
    discharge 57
    discharge, daily 58
    discharge, monthy 59
    gage heights 57–58
Authority for investigations 7
Azusa, Cal.,
  San Gabriel canal near:
    discharge 48
    discharge, daily 49, 50
    discharge, monthly 50, 51
  San Gabriel River near:
    description 47–48
    discharge 48
    discharge, daily 49

Page.

Azusa, Cal.—Continued.
  San Gabriel River near—Continued.
    discharge, monthly 49
    gage heights 48

B.

Baird, Cal.,
  McCloud River at:
    description 135
    discharge 136
    gage heights 136
Baker Creek near—
  Henderson, Cal.,
    discharge 200
Bakersfield, Cal.,
  Kern River near:
    description 66
    discharge, daily 66
    discharge, monthly 67
Balls Ferry, Cal.,
  Battle Creek near:
    discharge 201
  Bear Creek (Sacramento River basin) near:
    discharge 201
Barclay Springs (Upper Klamath Lake basin):
  discharge 202
Battle Creek near—
  Balls Ferry Cal.:
    discharge 201
Bear Creek (Sacramento River basin) near—
  Balls Ferry Cal.
    discharge 201
  Millville, Cal.:
    discharge 201
Bear Creek (San Joaquin River basin) near—
  Daunt, Cal.:
    discharge 199
Bear River (Yuba River basin) at—
  Van Trent, Cal.:
    description 161
    discharge 162
    discharge, daily 163
    discharge, monthly 163
    gage heights 162
Berry Creek near—
  mouth of creek:
    discharge 201
Bidwell Bar, Cal.,
  Feather River (Middle Fork) at:
    discharge 201
Big Bend, Cal.,
  Feather River (North Fork) near:
    description 147
    discharge, daily 147
    discharge, monthly 148
    Great Western Power Co.'s plant on, view of 144

Big Creek near—
Wawona, Cal.: Page.
description.... 86
discharge.... 86
Bowman dam, South Fork of Yuba River, view of.... 144
Bucks Creek near—
mouth of creek:
discharge.... 201
Bullards Bar, Cal.,
Little Oregon Creek at:
discharge.... 201
Willow Creek (Sacramento River basin) at:
discharge.... 201
Yuba River (North Fork) at:
discharge.... 201
Burney Creek near—
Burney, Cal.:
discharge.... 200
Butt Creek at—
Butte Valley, Cal.:
description.... 151
discharge, daily.... 151–152
discharge, monthly.... 152
Butte Valley, Cal.—
Butt Creek at:
description.... 151
discharge, daily.... 151–152
discharge, monthly.... 152

C.

Cache Creek at or near—
Lower Lake, Cal.:
description.... 167
discharge, daily.... 168
discharge, monthly.... 169
gage heights.... 168
Yolo, Cal.:
description.... 169
discharge.... 170
discharge, daily.... 170–171
discharge, monthly.... 171
gage heights.... 170
Cache Creek basin, description of.... 166
stream flow in.... 167–171
Cajon Creek below—
junction with Lone Pine Creek:
discharge.... 199
Calaveras River at—
Jenny Lind, Cal.:
description.... 110–111
discharge.... 111
discharge, daily.... 112
discharge, monthly.... 112
gage heights.... 111
Calaveras River basin, description of.... 110
stream flow in.... 110–112
Callahan, Cal.,
Scott River at:
discharge.... 202
Scott River (East Fork) near:
description.... 195
discharge.... 195
gage heights.... 196
Calpella, Cal.,
Russian River near: Page.
discharge.... 202
Campbell Creek near—
mouth of creek:
discharge.... 203
Camp Creek (Sacramento River basin) at—
wagon bridge:
discharge.... 201
Carbon, Cal.,
Hat Creek near:
discharge.... 200
Carrville, Cal.,
Trinity Gold Mine & Reduction Co.'s flume near:
discharge.... 203
Cassel, Cal.,
Rising River near:
discharge.... 200
Castella, Cal.,
Sacramento River at—
description.... 119
discharge.... 119
gage heights.... 120
Cayton, Cal.,
Pit River near:
discharge.... 200
Cayton Creek near—
Cayton Valley, Cal.:
discharge.... 200
Cherry Creek near—
Odessa road, Cal.:
discharge.... 202
China Flat, Cal.,
Willow Creek (Klamath River basin) at:
discharge.... 203
Chip Creek at—
mouth of creek:
discharge.... 201
Clapp, W. B., work of.... 19
Clark Creek near—
Pecks Bridge, Cal.:
discharge.... 200
Clavey River near—
Tuolumne, Cal.:
description.... 98
discharge.... 98
gage heights.... 98
Clements, Cal.,
Mokelumne River near:
description.... 113–114
discharge.... 114
discharge, daily.... 115
discharge, monthly.... 115
gage heights.... 114
Clover Creek near—
Millville, Cal.:
discharge.... 200
Cloverdale, Cal.,
Russian River at:
discharge.... 202
Coffee Creek at—
Coffee, Cal.:
description.... 197
discharge.... 197
gage heights.... 197

Columbia, Cal.,
Stanislaus River (South Fork) near: Page.
description 109
discharge 109
gage heights 109
Conness Creek (mouth),
Tuolumne River near, view of 86
Cooperation, credit for 18-19
Cooperative data, use of 17
Corral Creek near—
Groveland, Cal.:
description 96-97
discharge 97
gage heights 97
Cosumnes River at—
Michigan Bar, Cal.:
description 116
discharge 116
discharge, daily 117
discharge, monthly 118
gage heights 117
Cottonwood Creek (Goose Lake basin) near—
Lakeview, Oreg.:
description 126
discharge 126
discharge, daily 127, 128-129
discharge, monthly 129
gage heights 127
Cottonwood Creek (Lower Klamath Lake basin) at—
"J F" ranch, Cal.:
discharge 202
Cottonwood Creek (Sacramento River basin) basin, description of 136
stream flow in 136-138
Cottonwood Creek, North Fork of (Sacramento River basin) at—
Ono, Cal.:
description 136-137
discharge 137
discharge, daily 138
discharge, monthly 138
gage heights 137
Cottonwood Creek (Tia Juana River basin) near—
Jamul, Cal.:
description 23-24
discharge 24
discharge, daily 25, 27
discharge, monthly 26
gage heights 24-25
Cow Creek at—
Millville, Cal.:
discharge 200
Cow Creek (North Fork) near—
Millville, Cal.:
discharge 200
Cream Creek near—
Sevenmile Creek, Cal.:
discharge 202
Crescent Mills, Cal.,
Indian Creek near:
discharge 201
Cromberg, Cal.,
Feather River (Middle Fork) at:
description 152-153
discharge 153
gage heights 153
Crooked Creek at—
Klamath Agency, Oreg.: Page.
discharge 202
Current meters, views of 14
Current-meter stations, views of 14

D.

Data, explanation of 13-15
field methods used in collection of 9
Data on stream flow in publications of United States Geological Survey, character of 9-12
Daunt, Cal.,
Bear Creek (San Joaquin River basin) near:
discharge 199
Davis ditch at—
Downieville, Cal.:
discharge 201
Dean, H. J. work of 19
Deer Creek at or near—
Hot Springs, Cal.:
description 68
discharge 68
gage heights 69
Vina, Cal.:
discharge 201
Definition of terms 12-13
Descanso, Cal.,
Sweetwater River near:
description 28
discharge 29
discharge, daily 30
discharge, monthly 30
gage heights 29
Dinkey Creek near—
Ockenden, Cal.:
description 79
discharge 79
gage heights 79-80
Discharge, definition of 12
Discharge measurements, accuracy of 15-16
nature of 13-15
Downieville, Cal.,
Davis ditch at:
discharge 201
Yuba River (North Fork) at:
discharge 201
Yuba River (North Fork of North Fork of) at:
description 158
discharge 159
gage heights 159
Drainage basins, list of 9
Drews Creek (Goose Lake basin) near—
Lakeview, Oreg.:
description 129-130
discharge 130-131
discharge, daily 132-133
discharge, monthly 133-134
gage heights 131-132
Dulzura canal near—
Jamul, Cal.:
description 23
discharge 24
discharge, daily 26, 27
discharge, monthly 27
gage heights 26

Dyerville, Cal.,
Eel River at: Page.
discharge.... 202
Eel River (South Fork) near:
discharge.... 202

E.

Eel River at or near—
Dyerville, Cal.:
discharge.... 202
Scotia, Cal.:
description.... 176
discharge.... 176
gage heights.... 177
Eel River basin, description of.... 175
stream flow in.... 175–177
Eel River (Middle Fork) near—
junction with South Eel River:
discharge.... 202
Eel River (South Fork) at or near—
Dyerville, Cal.:
discharge.... 202
Garberville, Cal.:
discharge.... 202
Eleanor Creek near—
outlet of Lake Eleanor:
discharge.... 199
Enterprise, Cal.,
Feather River (South Fork) at:
discharge.... 201
Palermo Land & Water Co.'s canal at:
discharge.... 201
Equivalents, list of.... 12–13
Escondido, Cal.,
Santa Ysabel Creek near:
description.... 36–37
discharge.... 37
discharge, daily.... 38
discharge, monthly.... 38
gage heights.... 38

F.

Fairoaks, Cal.,
American River near:
description.... 164
discharge.... 165
discharge, daily.... 166
discharge, monthly.... 166
gage heights.... 165
Fall River near—
Fall River Mills, Cal.:
discharge.... 200
Feather River at—
Oroville, Cal.:
description.... 148–149
discharge.... 149
discharge, daily.... 150
discharge, monthly.... 151
gage heights.... 149–150
Feather River basin, description of.... 144–145
stream flow in.... 145–163
Feather River (East Branch) near—
mouth of river:
discharge.... 200
Feather River (Middle Fork) at or near—
Bidwell Bar, Cal.: Page.
discharge.... 201
Cromberg, Cal.:
description.... 152–153
discharge.... 153
gage heights.... 153
Langhorst's:
discharge.... 201
Little North Fork River:
discharge.... 201
Western Pacific Railway bridge:
discharge.... 201
Feather River (North Fork) near—
Big Bend, Cal.:
description.... 147
discharge, daily.... 147
discharge, monthly.... 148
Great Western Power Co.'s plant on,
view of.... 144
Ganzners, Cal.:
discharge.... 201
Prattville, Cal.:
description.... 145–146
discharge, daily.... 146
discharge, monthly.... 146
Feather River (South Fork) at—
Enterprise, Cal.:
discharge.... 201
Little Grass Valley, Cal.:
discharge.... 201
Fort Creek at—
Fort Klamath, Oreg.:
discharge.... 202
Fort Klamath, Oreg.,
Fort Creek at:
discharge.... 202
Wood Creek at:
discharge.... 202
French Creek (Sacramento River basin)
near—
railroad bridge:
discharge.... 201
Fresno Flats, Cal.,
Fresno River near:
description.... 81
discharge.... 82
gage heights.... 82
Fresno River near—
Fresno Flats, Cal.:
description.... 81
discharge.... 82
gage heights.... 82
Fresno River basin, description of.... 81
stream flow in.... 81–82
Fresno River (North Fork) near—
Sugar Pine, Cal.:
description.... 82
discharge.... 82
Friant, Cal.,
San Joaquin River near:
description.... 60
discharge.... 60
discharge, daily.... 61
discharge, monthly.... 62
gage heights.... 61

Fruto, Cal.,
Stony Creek, near: Page.
description 140
discharge 140
discharge, daily 141
discharge, monthly 142
gage heights 140
Fuller, E. S., work of 19

G.

Gage heights, readings of 14
Gaging stations, list of, maintained in—
Pacific Ocean (north) drainage basins 22
Pacific Ocean (south) drainage basins 19–20
Sacramento Valley 21–22
San Joaquin Valley 20–21
San Francisco Bay drainage basins 20–22
Gaging stations, views of 14
Ganzners, Cal.,
Feather River (North Fork) near:
discharge 201
Garberville, Cal.,
Eel River (South Fork) near:
discharge 202
Geyserville, Cal.,
Russian River at:
description 174
discharge 175
gage heights 175
Goodyear Bar, Cal.,
Goodyear Creek at:
description 160
discharge 161, 201
gage heights 161
Rock Creek (Sacramento River basin) at:
description 159
discharge 160, 201
gage heights 160
Woodruff Creek near:
discharge 201
Yuba River (North Fork) at:
description 156–157
discharge 157
gage heights 157
Goodyear Creek at—
Goodyear Bar, Cal.:
description 160
discharge 161, 201
gage heights 161
Goose Lake basin, stream flow in 126–133
Grizzly Creek near—
mouth of creek:
discharge 201
Groveland, Cal.,
Corral Creek near:
description 96–97
discharge 97
gage heights 97
Tuolumne River near:
description 97
discharge 97
gage heights 98

H.

Haines, R. E., work of 19
Hardy, W. V., work of 19
Hat Creek at or near—
Carbon, Cal.: Page.
discharge 200
Hat Creek, Cal.:
description 133
discharge 134
gage heights 134
Hatchet Creek near—
Henderson, Cal.:
discharge 200
Montgomery Creek, Cal.:
discharge 200
Hearst, Cal.,
South Eel River at:
description 175
discharge 176
gage heights 176
Henderson, Cal.
Baker Creek near:
discharge 200
Hatchet Creek near:
discharge 200
Kosk Creek near:
description 135
discharge 135
gage heights 135
Nelson Creek near:
discharge 200
Pit River at:
description 124
discharge 124
gage heights 125
Henshaw, F. F., work of 19
Herndon, Cal.,
San Joaquin River at:
description 62
Hetch Hetchy Valley, Rancheria Creek in, falls of, view of 86
Tuolumne River in—
discharge 199
Hoopa, Cal.,
Supply Creek at:
discharge 203
Trinity River at:
discharge 203
Hot Springs, Cal.,
Deer Creek at:
description 68
discharge 68
gage heights 69
Hunter Creek near—
Tuolumne, Cal.:
description 100
discharge 100
gage heights 101

I.

Indian Creek near—
Crescent Mills, Cal.:
discharge 201
Tuolumne, Cal.:
description 99
discharge 99
gage heights 99
Ingot, Cal.,
Little Cow Creek near:
discharge 201

Page.

Investigations, authority for..... 7
scope of..... 8
Isabella, Cal.,
Kern River at:
description..... 65
discharge..... 65
gage heights..... 65
Kern River power canal at:
discharge..... 199
Kern River (South Fork) at:
description..... 67
discharge..... 67
gage heights..... 68

J.

Jamul, Cal.,
Cottonwood Creek (Tia Juana River basin) near:
description..... 23–24
discharge..... 24
discharge daily..... 25, 27
discharge monthly..... 26
gage heights..... 24–25
Jamul, Cal.,
Dulzura canal near:
description..... 23
discharge..... 24
discharge, daily..... 26, 27
discharge, monthly..... 27
gage heights..... 26
Jawbone Creek near—
Tuolumne, Cal.:
description..... 95–96
discharge..... 96
gage heights..... 96
Jenny Lind, Cal.,
Calaveras River at:
description..... 110–111
discharge..... 111
discharge, daily..... 112
discharge, monthly..... 112
gage heights..... 111
J F ranch, Cal.,
Cottonwood Creek (Lower Klamath Lake basin) at:
discharge..... 202
Jones Creek at—
Pelican Bay, Cal.:
discharge..... 202
Jupiter, Cal.,
Knight Creek near:
description..... 108
discharge..... 108
gage heights..... 108
Rose Creek near:
description..... 107
discharge..... 107
gage heights..... 108

K.

Kaweah, Cal.,
Kaweah River (North Fork) at:
description..... 75
discharge..... 75
gage heights..... 76

Page.

Kaweah River basin, description of..... 72
stream flow in..... 73–76
Kaweah River near—
Three Rivers, Cal.:
description..... 73
discharge..... 73
discharge, daily..... 74
discharge, monthly..... 75
gage heights..... 74
Kaweah River (North Fork) at—
Kaweah, Cal.:
description..... 75
discharge..... 75
gage heights..... 76
Keno, Oreg.,
Klamath River at:
description..... 183
discharge, daily..... 184
discharge, monthly..... 185
gage heights..... 184
Kern River at or near—
Bakersfield, Cal.:
description..... 66
discharge, daily..... 66
discharge, monthly..... 67
Isabella, Cal.:
description..... 65
discharge..... 65
gage heights..... 65
Kern River basin, description of..... 64–65
stream flow in..... 65–68
Kern River power canal at—
Isabella, Cal.:
discharge..... 199
Kern River (South Fork) at—
Isabella, Cal.:
description..... 67
discharge..... 67
gage heights..... 68
Kings County, Cal.,
Tulare Lake in:
description..... 63
gage heights..... 64
Kings River basin, description of..... 76
stream flow in..... 76–80
Kings River near—
Sanger, Colo.:
description..... 76–77
discharge..... 77
discharge, daily..... 78
discharge, monthly..... 79
gage heights..... 78
figure showing..... 77
Kings River (North Fork) near—
Ockenden, Cal.:
discharge..... 199
Klamath Agency, Oreg.,
Crooked Creek at:
discharge..... 202
Williamson River near:
description..... 186
discharge, daily..... 188
discharge, monthly..... 188
gage heights..... 187

Klamath Falls, Oreg.,
Link River at: Page.
description ... 180–181
discharge ... 181
discharge, daily ... 182
discharge, monthly ... 183
gage heights ... 181–182
Upper Klamath Lake near:
description ... 179
gage heights ... 179
Klamath River at or near—
Keno, Oreg.:
description ... 183
discharge, daily ... 184
discharge, monthly ... 185
gage heights ... 184
Requa, Cal.:
description ... 185
discharge ... 185
gage heights ... 185
Weitchpec, Cal.:
discharge ... 202
Klamath River basin, description of ... 178
stream flow in ... 179–198
Knight Creek near—
Jupiter, Cal.:
description ... 108
discharge ... 108
gage heights ... 108
Knights Ferry, Cal.,
Schell ditch at:
description ... 104
discharge, daily ... 106
discharge, monthly ... 107
Stanislaus River at:
description ... 101–102
discharge ... 102
discharge, daily ... 103
discharge, monthly ... 104
gage heights ... 103
Stanislaus Water Co.'s canal near:
description ... 104
discharge ... 104
discharge, daily ... 105, 106
discharge, monthly ... 106, 107
gage heights ... 105
Kosk Creek near—
Henderson, Cal.:
description ... 135
discharge ... 135
gage heights ... 135

L.

Lagrange, Cal.,
Modesto canal near:
description ... 90
discharge ... 90
discharge, daily ... 91
discharge, monthly ... 92, 94
gage heights ... 91
Lagrange Water & Power Co.'s canal near:
description ... 94
discharge, daily ... 95
discharge, monthly ... 95
gage heights ... 95
Lagrange, Cal.—Continued.
Tuolumne River near: Page.
description ... 87–88
discharge ... 88
discharge, daily ... 89
discharge, monthly ... 90, 94
gage heights ... 88–89
Turlock canal near:
description ... 92
discharge ... 92
discharge, daily ... 93
discharge, monthly ... 94
gage heights ... 93
Lagrange Water & Power Co.'s canal near—
Lagrange, Cal.:
description ... 94
discharge, daily ... 95
discharge, monthly ... 95
gage heights ... 95
Lakeside, Cal.,
San Diego flume near:
description ... 31
discharge ... 33
discharge, daily ... 34, 35
discharge, monthly ... 35, 36
gage heights ... 34
San Diego River near:
description ... 31
discharge ... 32
discharge, daily ... 33, 35
discharge, monthly ... 33, 36
gage heights ... 32
Lakeview, Oreg.,
Cottonwood Creek (Goose Lake basin) near:
description ... 126
discharge ... 126
discharge, daily ... 127, 128–129
discharge, monthly ... 129
gage heights ... 127
Drews Creek near:
description ... 129–130
discharge ... 130–131
discharge, daily ... 132–133
discharge, monthly ... 133–134
gage heights ... 131–132
Lewiston, Cal.,
Trinity River at:
discharge ... 202
Link River at—
Klamath Falls, Oreg.:
description ... 180–181
discharge ... 181
discharge, daily ... 182
discharge, monthly ... 183
gage heights ... 181–182
Little Cow Creek near—
Ingot, Cal.:
discharge ... 201
Little Cow Creek near—
Palo Cedro, Cal.:
discharge ... 201
Little Grass Valley, Cal.,
Feather River (South Fork) at:
discharge ... 201

Page.

Little North Fork River (Middle Fork of Feather River basin) at—
mouth of river:
discharge..... 201
Little Oregon Creek at—
Bullards Bar, Cal.:
discharge..... 201
Little Stony Creek near—
Lodoga, Cal.:
description..... 142
discharge..... 142
discharge, daily..... 143
discharge, monthly..... 144
gage heights..... 413
Lodoga, Cal.,
Little Stony Creek near:
description..... 142
discharge..... 142
discharge, daily..... 143
discharge, monthly..... 144
gage heights..... 143
Lompoc, Cal.,
Santa Ynez River near:
description..... 54
discharge..... 54
discharge, daily..... 55
discharge, monthly..... 56
gage heights..... 54–55
Looseley ranch, Cal.,
Sevenmile Creek near
discharge..... 202
Los Angeles River basin, description of..... 51
stream flow in..... 51–52
Los Molinos, Cal.,
Mill Creek near:
description..... 138–139
discharge..... 139
gage heights..... 139
Lost River at—
Olene, Oreg.:
description..... 188–189
discharge..... 189
discharge, daily..... 18
discharge, monthly..... 191
gage heights..... 190
Lorella, Oreg.,
Miller Creek near:
description..... 192–193
discharge..... 193
discharge, daily..... 194
discharge, monthly..... 195
gage heights..... 193–194
Lower Lake, Cal.,
Cache Creek at:
description..... 167
discharge, daily..... 168
discharge, monthly..... 169
gage heights..... 168

M.

McCloud River at—
Baird, Cal.:
description..... 135
discharge..... 136
gage heights..... 136
McFarland's ranch, Cal.,
Tule ditch near:
discharge..... 203
McGlashan, H. D., work of..... 19
Mad River basin, description of..... 177
stream flow in..... 177–178
Mad River near—
Arcata, Cal.:
description..... 177
discharge..... 177
gage heights..... 178
Mathers, J. G., work of..... 19
Mentone, Cal.—
Mentone Power Co.'s canal near:
description..... 42
discharge..... 43
discharge, daily..... 45, 46
discharge, monthly..... 45, 46
Santa Ana River near:
description..... 41–42
discharge..... 42
discharge, daily..... 44, 46
discharge, monthly..... 44, 46
gage heights..... 43
Mentone Power Co.'s canal near—
Mentone, Cal.:
description..... 42
discharge..... 43
discharge, daily..... 45, 46
discharge, monthly..... 45, 46
Merced Falls, Cal.—
Merced River near:
description..... 83
discharge..... 83
discharge, daily..... 84
discharge, monthly..... 85
gage heights..... 84
Merced River basin description of..... 82–83
stream flow in..... 83–86
Merced River near—
Merced Falls, Cal.:
description..... 83
discharge..... 83
discharge, daily..... 84
discharge, monthly..... 85
gage heights..... 84
Merced River (South Fork) at or near—
junction of Big Creek:
discharge..... 199
Wawona, Cal.:
description..... 85
discharge..... 85
gage heights..... 86
Merrill, Oreg.—
Tule Lake near:
description..... 191
gage heights..... 192
Miami Creek, Cal. *See* Fresno River (North Fork).
Michigan Bar, Cal.—
Cosumnes River at:
description..... 116
discharge..... 116
discharge, daily..... 117
discharge, monthly..... 118
gage heights..... 117
Milk Ranch Creek near—
wagon bridge:
discharge..... 201

Page.

ill Creek basin, description of..... 138–139
stream flow in..... 138–139
ill Creek near—
Los Molinos, Cal.:
description..... 138–139
discharge..... 139
gage heights..... 139
wagon bridge:
discharge..... 201
iller Creek near—
Lorella, Oreg.:
description..... 192–193
discharge..... 193
discharge, daily..... 194
discharge, monthly..... 195
gage heights..... 193–194
illville, Cal.—
Bear Creek (Sacramento River basin) near:
discharge..... 201
Clover Creek near:
discharge..... 200
Cow Creek at:
discharge..... 200
Cow Creek (North Fork) near:
discharge..... 200
Oak Run Creek near:
discharge..... 200
Miscellaneous measurements in—
Pacific Ocean (north) drainage basins.. 202–203
Pacific Ocean (south) drainage basins.... 199
Sacramento River drainage basin..... 200–202
San Joaquin River drainage basin..... 199
Modesto canal near—
Lagrange, Cal.:
description..... 90
discharge..... 90
discharge, daily..... 91
discharge, monthly..... 92, 94
gage heights..... 91
Mokelumne River basin, description of..... 113
stream flow in..... 113–115
Mokelumne River near—
Clements, Cal.:
description..... 113–114
discharge..... 114
discharge, daily..... 115
discharge, monthly..... 115
gage heights..... 114
Monk, P. S., work of..... 19
Montgomery Creek, Cal.—
Hatchet Creek near:
discharge..... 200
Roaring Creek near:
discharge..... 200
Montgomery Creek near—
Montgomery Creek, Cal.:
discharge..... 200
Moser, Leland, work of..... 19

N.

Nelson Creek near—
Henderson, Cal.:
discharge..... 200
Nelson Creek near—
wagon bridge:
discharge..... 201
Norcross, T. W., work of..... 19
North San Juan, Cal.,
Oregon Creek near:
description..... 158
discharge..... 158
gage heights..... 158
Yuba River (Middle Fork) near:
description..... 153
discharge..... 153, 202
gage heights..... 154

O.

Oak Run Creek near—
Millville, Cal.:
discharge..... 200
Ockenden, Cal.,
Dinkey Creek near:
description..... 79
discharge..... 79
gage heights..... 79–80
Kings River (North Fork) near:
discharge..... 199
Rush Creek near:
description..... 80
discharge..... 80
gage heights..... 80
Odessa, Cal.,
Rock Creek (Upper Klamath Lake basin) near:
discharge..... 202
Old Cow Creek near—
Whitman, Cal.:
discharge..... 200
Olene, Oreg.,
Lost River at:
description..... 188–189
discharge..... 189
discharge, daily..... 190
discharge, monthly..... 191
gage heights..... 190
Ono, Cal.,
Cottonwood Creek, North Fork of (Sacramento River basin), at:
description..... 136–137
discharge..... 137
discharge, daily..... 138
discharge, monthly..... 138
gage heights..... 137
Oregon Creek near—
North San Juan, Cal.:
description..... 158
discharge..... 158
gage heights..... 158
Orick, Cal.,
Redwood Creek at:
discharge..... 202
Oroville, Cal.,
Feather River at:
description..... 148–149
discharge..... 149
discharge, daily..... 150
discharge, monthly..... 151
gage heights..... 149–150

P.

Pacific, Cal.,
American River (South Fork) near:
discharge..... 202

Page.

Pacific Ocean (north) drainage basins, gaging stations in, list of 22
miscellaneous measurements in..... 202–203
stream flow in..... 174–198
Pacific Ocean (south) drainage basins, description of..... 22–23
gaging stations in, list of..... 19–20
miscellaneous measurements in..... 199
stream flow in..... 33–59
Padgett, H. D., work of..... 19
Pala, Cal.,
San Luis Rey River near:
description..... 39
discharge..... 40
discharge, daily..... 41
discharge, monthly..... 41
gage heights..... 40
Palermo Land & Water Co.'s canal at—
Enterprise, Cal.:
discharge..... 201
Palo Cedro, Cal.,
Little Cow Creek near:
discharge..... 201
Pasadena, Cal.,
Arroyo Seco near:
description..... 51
discharge..... 25, 199
gage heights..... 52
Patch, W. W., work of..... 19
Pecks Bridge, Cal.,
Clark Creek near:
discharge..... 200
Peekema, G. T., work of..... 19
Pelican Bay, Cal.,
Jones Creek at:
discharge..... 202
Rock Creek (Upper Klamath Lake basin) at:
discharge..... 202
Pit River at or near—
Clayton, Cal.:
discharge..... 200
Henderson, Cal.:
description..... 124
discharge..... 124
gage heights..... 125
Pittville, Cal.:
discharge..... 200
Ydalpom, Cal.:
description..... 125
discharge..... 125
gage heights..... 125
Pit River basin, description of..... 123–124
stream flow in..... 124–135
Pittville, Cal.,
Pit River near:
discharge..... 200
Piute Creek in—
Pleasant Valley Cal.:
discharge..... 199
Pleasant Valley, Cal.,
Piute Creek in:
discharge..... 199
Pocket, Cal.,
Spanish Creek at:
discharge..... 201

Page.

Portersville, Cal.,
Tule River near:
description..... 69
discharge..... 70
discharge, daily..... 71
discharge, monthly..... 71
gage heights..... 70
Prattville, Cal.,
Feather River (North Fork) below:
description..... 145–146
discharge, daily..... 146
discharge monthly..... 146
Price meters, views of..... 14
Publications of United States Geological Survey, data on stream flow in..... 9–12
Putah Creek at—
Winters, Cal.:
description..... 171–172
discharge..... 172
discharge, daily..... 173
discharge, monthly..... 174
gage heights..... 173
Putah Creek basin, description of..... 171–172
stream flow in..... 171–174

R.

Rancheria Creek (Hetch Hetchy Valley), falls of, view of..... 86
Rating curves and tables, accuracy of..... 15–16
construction of..... 14–15
Red Bluff, Cal.,
Antelope Creek near:
discharge..... 201
Sacramento River near:
description..... 123
discharge..... 121
discharge, daily..... 122–122
discharge, monthly..... 123
gage heights..... 122
Redwood Creek, Cal. *See* Fresno River.
Redwood Creek at—
Orick, Cal.:
discharge..... 202
Requa, Cal.,
Klamath River near:
description..... 185
discharge..... 185
gage heights..... 185
Revision, need for..... 17
Rice, R. C., work of..... 19
Rising River near—
Cassel, Cal.:
discharge..... 200
Roaring Creek near—
Montgomery Creek, Cal.:
discharge..... 200
Rock Creek (Sacramento River basin) at—
Goodyear Bar, Cal:
description..... 159
discharge..... 160
gage heights..... 160
Mouth of creek:
discharge..... 201
Rock Creek (Upper Klamath Lake basin) at or near—
Odessa, Cal.:
discharge..... 202

Page.

Rock Creek (Upper Klamath Lake basin) at or near—
Pelican Bay, Cal.:
discharge... 202
Rock Creek (Yuba River basin) near—
Goodyear Bar, Cal.:
discharge... 201
Rose Creek near—
Jupiter, Cal.:
description... 107
discharge... 107
gage heights... 108
run-off, definition of... 12
Rush Creek near—
Ockenden, Cal.:
description... 80
discharge... 80
gage heights... 80
Russian River at or near—
Calpella, Cal.:
discharge... 202
Cloverdale, Cal.:
discharge... 202
Russian River at—
Geyserville, Cal.:
description... 174
discharge... 175
gage heights... 175
Russian River basin, description of... 174
stream flow in... 174–175
Russian River (East Fork) near—
Ukiah, Cal.:
discharge... 202

S.

Sacramento River at or near—
Antler, Cal.:
description... 120
discharge... 120
gage heights... 120
Castella, Cal.:
description... 119
discharge... 119
gage heights... 120
Red Bluff, Cal.:
description... 121
discharge... 122
discharge, daily... 122–123
discharge, monthly... 123
gage heights... 122
Sacramento River near—
Sisson, Cal.:
discharge... 200
Sacramento River basin, description of... 118–119
gaging stations in, list of... 21–22
miscellaneous measurements in... 200–202
stream flow in... 119–174
Salinas River basin, description of... 56
stream flow in... 56–59
San Diego flume near—
Lakeside, Cal.:
description... 31
discharge... 33
discharge, daily... 34, 35
discharge, monthly... 35, 36
gage heights... 34

Page.

San Diego River basin, description of... 31
stream flow in... 31–36
San Diego River near—
Lakeside, Cal.:
description... 31
discharge... 32
discharge, daily... 33, 35
discharge, monthly... 33, 36
gage heights... 32
San Dieguito (formerly Bernardo) River basin, description of... 36
stream flow in... 36–38
San Francisco Bay drainage basins, gaging stations in, list of... 20–22
stream flow in... 59–174
San Gabriel canal near—
Azusa, Cal.:
discharge... 48
discharge, daily... 49, 50
discharge, monthly... 50, 51
San Gabriel River basin, description of... 47
stream flow in... 47–51
San Gabriel River near—
Azusa, Cal.:
description... 47–48
discharge... 48
discharge, daily... 49
discharge, monthly... 49
gage heights... 48
San Gabriel River (North Fork of West Fork) near—
mouth of river:
discharge... 199
San Gabriel River (West Fork) above—
junction with North Fork:
discharge... 199
Sanger, Colo.,
Kings River near:
description... 76–77
discharge... 77
discharge, daily... 78
discharge, monthly... 79
gage heights... 78
figure showing... 77
San Joaquin River at or near—
Friant, Cal.:
description... 60
discharge... 60
discharge, daily... 61
discharge, monthly... 62
gage heights... 61
Herndon, Cal.:
description... 62
San Joaquin River basin, description of... 59–60
gaging stations in, list of... 20–21
miscellaneous measurements in... 199
stream flow in... 59–118
San Luis Rey River basin, description of... 39
stream flow in... 39–41
San Luis Rey River near—
Pala, Cal.:
description... 39
discharge... 40
discharge, daily... 41
discharge, monthly... 41
gage heights... 40

Page.

Santa Ana River basin, description of..... 41–42
stream flow in..... 41–46
Santa Ana River near—
Mentone, Cal.:
description..... 41–42
discharge..... 42
discharge, daily..... 44, 46
discharge, monthly..... 44, 46
gage heights..... 43
Santa Barbara, Cal.,
Santa Ynez River near:
description..... 53
gage heights..... 53
Santa Ynez River basin, description of..... 52
stream flow in..... 52–56
Santa Ynez River near—
Lompoc, Cal.:
description..... 54
discharge..... 54
discharge, daily..... 55
discharge, monthly..... 56
gage heights..... 54–55
Santa Barbara, Cal.:
description..... 53
gage heights..... 53
Santa Ysabel Creek near—
Escondido, Cal.:
description..... 36–37
discharge..... 37
discharge, daily..... 38
discharge, monthly..... 38
gage heights..... 38
Schell ditch at—
Knights Ferry, Cal.:
description..... 104
discharge, daily..... 106
discharge, monthly..... 107
Scotia, Cal.,
Eel River near:
description..... 176
discharge..... 176
gage heights..... 177
Scott River near—
Callahan, Cal.:
discharge..... 202
Scott River (East Fork) near—
Callahan, Cal.:
description..... 195
discharge..... 195
gage heights..... 196
Second-foot, definition of..... 12
Sevenmile Creek near—
Looseley ranch, Cal.:
discharge..... 202
Sisson, Cal.,
Sacramento River near:
discharge..... 200
Wagon Creek near:
discharge..... 200
Smartsville, Cal.,
Yuba River near:
description..... 154–155
discharge..... 155
discharge, daily..... 156
discharge, monthly..... 156
gage heights..... 155

Page.

Soledad, Cal.,
Arroyo Seco near:
description..... 56–57
discharge..... 57
discharge, daily..... 58
discharge, monthly..... 59
gage heights..... 57–58
South Eel River at or near—
Hearst, Cal.:
description..... 175
discharge..... 176
gage heights..... 176
junction with Middle Fork of Eel River:
discharge..... 200
Spanish Creek at—
Pocket, Cal.:
discharge..... 200
Spring Creek, Oreg.,
Williamson River below. *See* Klamath Agency.
Squaw Creek at—
Ydalpom, Cal.:
discharge..... 200
Stanislaus River at or near—
Knights Ferry, Cal.:
description..... 101–102
discharge..... 102
discharge, daily..... 103
discharge, monthly..... 104
gage heights..... 103
mouth of North Fork of Stanislaus River:
discharge..... 199
Stanislaus River basin, description of..... 181
stream flow in..... 101–109
Stanislaus River (South Fork) near—
Columbia, Cal.
description..... 109
discharge..... 109
gage heights..... 109
Stanislaus Water Co.'s canal near—
Knights Ferry, Cal.:
description..... 104
discharge..... 104
discharge, daily..... 105, 106
discharge, monthly..... 106, 107
gage heights..... 105
Stevens, G. C., work of..... 19
Stewart, J. E., work of..... 19
Stony Creek basin, description of..... 139–140
stream flow in..... 140–144
Stony Creek near—
Fruto, Cal.:
description..... 140
discharge..... 140
discharge, daily..... 141
discharge, monthly..... 142
gage heights..... 140
Stream measurement, accuracy of..... 15–16
Success, Cal.,
Tule River (South Fork) near:
description..... 71–72
discharge..... 72
gage heights..... 72
Sugar Pine, Cal.,
Fresno River (North Fork) near:
description..... 82
discharge..... 82

Page.

Supply Creek at—
Hoopa, Cal.:
discharge..... 203
Sweetwater River basin, description of..... 28
stream flow in..... 28–30
Sweetwater River near—
Descanso, Cal.:
description..... 28
discharge..... 29
discharge, daily..... 30
discharge, monthly..... 30
gage heights..... 29
Swift Creek near—
Trinity Center, Cal.:
description..... 198
discharge..... 198
gage heights..... 198

T.

Tables, explanation of..... 13–15
Terms, definitions of..... 12
Three Rivers, Cal.,
Kaweah River near:
description..... 73
discharge..... 73
discharge, daily..... 74
discharge, monthly..... 75
gage heights..... 74
Tia Juana River basin, stream flow in..... 23–28
Tompkins, H. J work of..... 19
Trinity Center, Cal.,
Swift Creek near:
description..... 198
discharge..... 198
gage heights..... 198
Trinity River near:
description..... 196
discharge..... 196
gage heights..... 196
Trinity River (East Fork) near:
description..... 197–198
discharge..... 198
gage heights..... 198
Trinity Gold Mine & Reduction Co.'s flume near—
Carrville, Cal.:
discharge..... 203
Trinity River at or near—
Hoopa, Cal.:
discharge..... 203
Lewiston, Cal.:
discharge..... 202
Trinity Center, Cal.:
description..... 196
discharge..... 196
gage heights..... 196
Trinity River (East Fork) near—
Trinity Center, Cal.:
description..... 197–198
discharge..... 198
gage heights..... 198
Trinity River (South Fork) near—
mouth of river:
discharge..... 203
Tulare Lake basin, description of..... 62–63
stream flow in..... 63–76

Page.

Tulare Lake in—
Kings County, Cal.:
description..... 63
gage heights..... 64
Tule ditch near—
McFarland's ranch, Cal.:
discharge..... 199
Tule Lake near—
Merrill, Oreg.:
description..... 191
gage heights..... 192
Tule River basin, description of..... 69
stream flow in..... 69–72
Tule River near—
Portersville, Cal.:
description..... 69
discharge..... 70
discharge, daily..... 71
discharge, monthly..... 71
gage heights..... 70
Tule River (South Fork) near—
Success, Cal.:
description..... 71–72
discharge..... 72
gage heights..... 72
Tuolumne, Cal.,
Clavey River near:
description..... 98
discharge..... 98
gage heights..... 98
Hunter Creek near:
description..... 100
discharge..... 100
gage heights..... 101
Indian Creek near:
description..... 99
discharge..... 99
gage heights..... 99
Jawbone Creek near:
description..... 95–96
discharge..... 96
gage heights..... 96
Tuolumne River (North Fork) near:
description..... 99–100
discharge..... 100
gage heights..... 100
Tuolumne River basin, description of..... 86–87
stream flow in..... 87–101
Tuolumne River in or near—
Conness Creek (mouth), view of..... 86
Groveland, Cal.:
description..... 97
discharge..... 97
gage heights..... 98
Hetch Hetchy Valley:
discharge..... 199
Lagrange, Cal.:
description..... 87–88
discharge..... 88
discharge, daily..... 89
discharge, monthly..... 90, 94
gage heights..... 88–89
mouth of South Fork of Tuolumne River:
discharge..... 199
Tuolumne River (North Fork) near—
Tuolumne, Cal.:
description..... 99–100
discharge..... 100
gage heights..... 100

Turlock canal near—
Lagrange, Cal.: Page.
description 92
discharge 92
discharge, daily 93
discharge, monthly 94
gage heights 93
Tuttle, A. H., work of 19

U.

Ukiah, Cal.,.
Russian River (East Fork) near:
discharge 202
Upper Klamath Lake near—
Klamath Falls, Oreg.:
description 179
gage heights 179

V.

Vanduzen River near—
Alton, Cal.:
discharge 202
Van Trent, Cal.,
Bear River (Yuba River basin) at:
description 161
discharge 162
discharge, daily 163
discharge, monthly 163
gage heights 162
Vina, Cal.,
Deer Creek near:
discharge 201

W.

Wagon Creek near—
Sisson, Cal.:
discharge 200
Walters, M. I., work of 19
Washington, Cal.,
Yuba River (South Fork) at:
discharge 202
Wawona, Cal.,
Big Creek near:
description 86
discharge 86
Merced River (South Fork) at:
description 85
discharge 85
gage heights 86
Weitchpec, Cal.,
Klamath River near:
discharge 202
White River basin, description of 68
stream flow in 68–69
Whitman, Cal.,
Old Cow Creek near:
discharge 200
Williamson River at or near—
Klamath Agency, Oreg.:
description 186
discharge, daily 188
discharge, monthly 188
gage heights 187
Spring Creek, Oreg. *See* Klamath Agency.
Willow Creek (Klamath River basin) at—
China Flat, Cal.:
discharge 203
Willow Creek (Lower Klamath Lake basin) at—
Davis School, Cal.:
discharge 202
Willow Creek (Sacramento River basin) at—
Bullards Bar, Cal.: Page.
discharge 201
Winters, Cal.,
Putah Creek at:
description 171–172
discharge 172
discharge, daily 173
discharge, monthly 174
gage heights 173
Wood, B. D., work of 19
Wood, F. G., work of 19
Wood River at—
Fort Klamath, Oreg.:
discharge 202
Woodruff Creek near—
Goodyear Bar, Cal.:
discharge 201
Work, division of 19

Y.

Yadon, J. C., work of 19
Ydalpom, Cal.,
Pit River near:
description 125
discharge 125
gage heights 125
Squaw Creek at:
discharge 200
Yellow Creek near—
mouth of creek:
discharge 201
Yolo, Cal.,
Cache Creek near:
description 169
discharge 170
discharge, daily 170–171
discharge, monthly 171
gage heights 170
Yuba River near—
Smartsville, Cal.:
description 154–155
discharge 155
discharge, daily 156
discharge, monthly 156
gage heights 155
Yuba River (Middle Fork) near—
North San Juan, Cal.:
description 153
discharge 153, 202
gage heights 154
Yuba River (North Fork) at—
Bullards Bar, Cal.:
discharge 201
Downieville, Cal.:
discharge 201
Yuba River (North Fork) at—
Goodyear Bar, Cal.:
description 156–157
discharge 157
gage heights 157
Yuba River (North Fork of North Fork) at—
Downieville, Cal.:
description 158
discharge 159
gage heights 159
Yuba River (South Fork), Bowman dam on, view of 144
Yuba River (South Fork) at—
Washington, Cal.:
discharge 202

CECIL H. GREEN LIBRARY
STANFORD UNIVERSITY LIBRAR
STANFORD, CALIFORNIA 94305-
(650) 723-1493
grncirc@sulmail.stanford.edu
All books are subject to recall.

DATE DUE